P-974H/HW Series

Cable Router

User's Guide

Default Login Details

IP Address	http:// 192.168.1.1:8080
User Name	webadmin
Password	1234

Firmware Version 3.70
Edition 2, 09/2009

www.zyxel.com

ZyXEL

About This User's Guide

Intended Audience

This manual is intended for people who want to configure the ZyXEL Device using the web configurator. You should have at least a basic knowledge of TCP/IP networking concepts and topology.

Related Documentation

- Quick Start Guide

  The Quick Start Guide is designed to help you get up and running right away. It contains information on setting up your network and configuring for Internet access.

- Support Disc

  Refer to the included CD for support documents.

- ZyXEL Web Site

  Please refer to www.zyxel.com for additional support documentation and product certifications.

User Guide Feedback

Help us help you. Send all User Guide-related comments, questions or suggestions for improvement to the following address, or use e-mail instead. Thank you!

The Technical Writing Team,
ZyXEL Communications Corp.,
6 Innovation Road II,
Science-Based Industrial Park,
Hsinchu, 300, Taiwan.

E-mail: techwriters@zyxel.com.tw

Document Conventions

Warnings and Notes

These are how warnings and notes are shown in this User's Guide.

Warnings tell you about things that could harm you or your device.

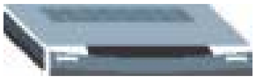
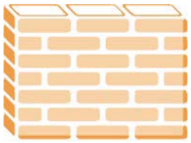
Note: Notes tell you other important information (for example, other things you may need to configure or helpful tips) or recommendations.

Syntax Conventions

- This product may be referred to as the "ZyXEL Device", the "device" or the "system" in this User's Guide.
- Product labels, screen names, field labels and field choices are all in **bold** font.
- A key stroke is denoted by square brackets and uppercase text, for example, [ENTER] means the "enter" or "return" key on your keyboard.
- "Enter" means for you to type one or more characters and then press the [ENTER] key. "Select" or "choose" means for you to use one of the predefined choices.
- A right angle bracket (>) within a screen name denotes a mouse click. For example, **Maintenance > Log > Log Setting** means you first click **Maintenance** in the navigation panel, then the **Log** sub menu and finally the **Log Setting** tab to get to that screen.
- Units of measurement may denote the "metric" value or the "scientific" value. For example, "k" for kilo may denote "1000" or "1024", "M" for mega may denote "1000000" or "1048576" and so on.
- "e.g.," is a shorthand for "for instance", and "i.e.," means "that is" or "in other words".

Icons Used in Figures

Figures in this User's Guide may use the following generic icons. The ZyXEL Device icon is not an exact representation of your device.

ZyXEL Device 	Computer 	Notebook computer
Server 	Printer 	Firewall 
Telephone 	Switch 	Router

Safety Warnings

- Use only No. 26 AWG (American Wire Gauge) or larger telecommunication line cord.
- Do NOT use this product near water, for example, in a wet basement or near a swimming pool.
- Do NOT expose your device to dampness, dust or corrosive liquids.
- Do NOT store things on the device.
- Do NOT install, use, or service this device during a thunderstorm. There is a remote risk of electric shock from lightning.
- Connect ONLY suitable accessories to the device.
- Do NOT open the device or unit. Opening or removing covers can expose you to dangerous high voltage points or other risks. ONLY qualified service personnel should service or disassemble this device. Please contact your vendor for further information.
- Make sure to connect the cables to the correct ports.
- Place connecting cables carefully so that no one will step on them or stumble over them.
- Always disconnect all cables from this device before servicing or disassembling.
- Use ONLY an appropriate power adaptor or cord for your device.
- Connect the power adaptor or cord to the right supply voltage (for example, 110V AC in North America or 230V AC in Europe).
- Do NOT allow anything to rest on the power adaptor or cord and do NOT place the product where anyone can walk on the power adaptor or cord.
- Do NOT use the device if the power adaptor or cord is damaged as it might cause electrocution.
- If the power adaptor or cord is damaged, remove it from the power outlet.
- Do NOT attempt to repair the power adaptor or cord. Contact your local vendor to order a new one.
- Do not use the device outside, and make sure all the connections are indoors. There is a remote risk of electric shock from lightning.
- Do NOT obstruct the device ventilation slots, as insufficient airflow may harm your device.
- Antenna Warning! This device meets FCC certification requirements when using the included antenna(s). Only use the included antenna(s).
- Make sure that the cable system is grounded so as to provide some protection against voltage surges.

This product is recyclable. Dispose of it properly.

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PART I

Introduction and Configuration

1

Introduction

1.1 Overview

This user’s guide explains how to configure the following ZyXEL devices:

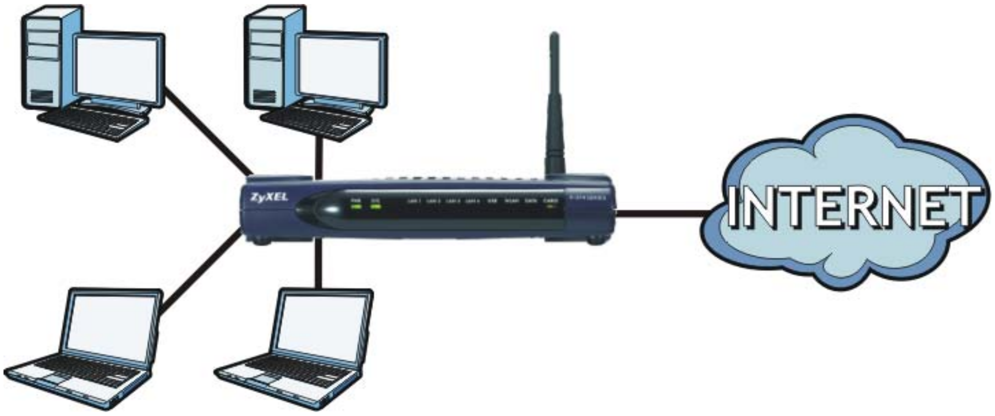
- The P-974H model is a 4-port cable modem and router combined. It also has a USB 2.0 port allowing computers without an Ethernet connection to join your network.
- The P-974HW model adds IEEE 802.11g wireless capability allowing wireless clients to join your network.

This user’s guide refers to these models simply as the “ZyXEL Device”. Please refer to Appendix A on page 71 for a complete list of features for your model.

1.2 Internet Access Application

The ZyXEL Device is the ideal high-speed Internet access solution. It is compliant with the DOCSIS 2.0 and Cable Home 1.1 standards. The ZyXEL Device allows you to connect up to four computers to its 10/100 Mbps Ethernet ports and an additional computer to its USB 2.0 port to form your local area network and connect to the Internet. In addition, for P-974HW, wireless clients can access your network resources and the Internet.

Figure 1 Internet Access Application



1.3 Hardware Connection and Installation

Refer to the Quick Start Guide for information for hardware connections and USB driver installation.

1.4 Front Panel LED Description

The following figures are front panel images of the P-974HW and P-974H models respectively. The LED behavior is described at the end of this section.

Figure 2 Front Panel LEDs: P-974H

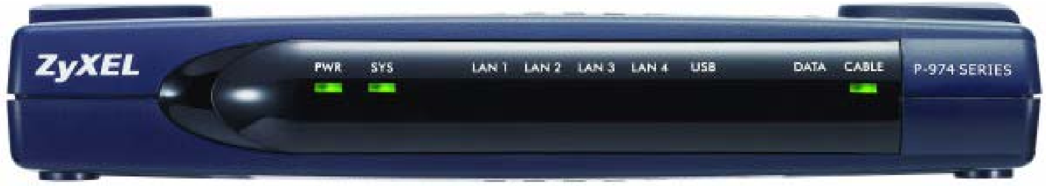
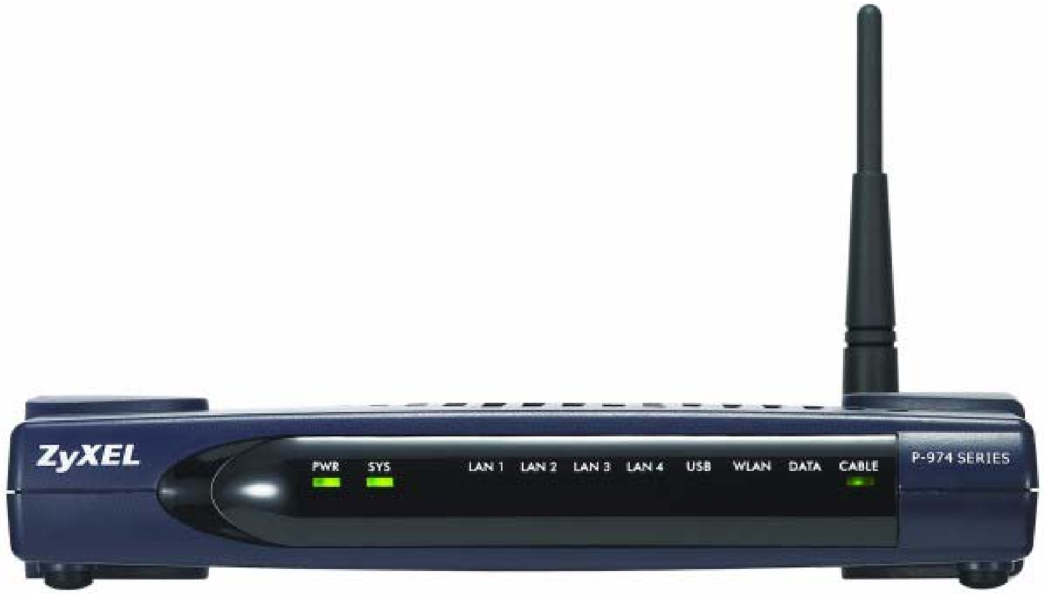


Figure 3 Front Panel LEDs: P-974HW



The following table describes the LEDs.

Table 1 Front Panel LEDs

LED	COLOR	STATUS	DESCRIPTION
PWR	Green	On	The ZyXEL Device is receiving power.
		Off	The ZyXEL Device is not receiving power.
SYS	Green	On	The ZyXEL Device is functioning properly.
		Off	The system is not ready or has malfunctioned.

Table 1 Front Panel LEDs (continued)

LED	COLOR	STATUS	DESCRIPTION
LAN 1...4	Green	On	The ZyXEL Device has a successful 10/100Mb Ethernet connection.
		Blinking	The ZyXEL Device is sending/receiving data.
		Off	The LAN is not connected.
USB	Green	On	A device is connected to the USB port on the ZyXEL Device.
		Blinking	The ZyXEL Device is sending/receiving data via the USB port.
		Off	The USB port is not connected.
WLAN	Green	On	The wireless LAN is enabled.
		Blinking	The ZyXEL Device is sending/receiving data through the wireless LAN.
		Off	The wireless LAN is disabled.
DATA	Green	Blinking	The ZyXEL Device is sending/receiving data on the WAN.
		Off	The ZyXEL Device is not sending/receiving data on the WAN.
CABLE	Green	On	The ZyXEL Device has successfully registered to the cable operator’s network.
		Blinking	The ZyXEL Device is trying to register with the cable operator’s network.
		Off	The coaxial cable is not connected or the cable link is down.

CHAPTER 2

The Web Configurator

2.1 Overview

The web configurator is an HTML-based management interface that allows easy setup and management via an Internet browser. Use Internet Explorer 6.0 and later or Firefox 1.5 and later versions. The recommended screen resolution is 1024 by 768 pixels.

In order to use the web configurator you need to allow:

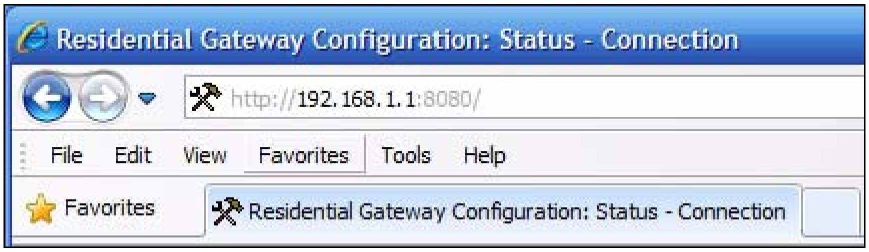
- Web browser pop-up windows from your device. Web pop-up blocking is enabled by default in Windows XP SP (Service Pack) 2.
- JavaScript (enabled by default).
- Java permissions (enabled by default).

See the chapter on troubleshooting to see how to make sure these functions are allowed in Internet Explorer or Firefox.

2.2 Accessing the Web Configurator

Follow the steps below to log into the web configurator.

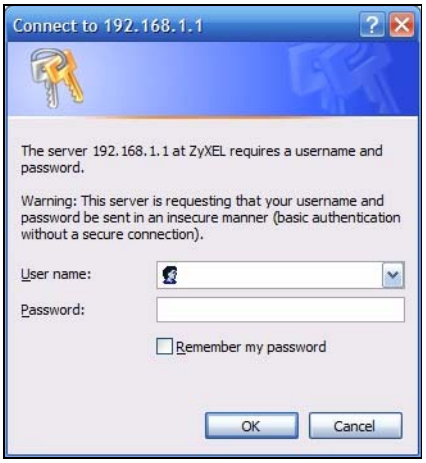
1 Launch your web browser. Enter “192.168.1.1:8080” as the web site address.



Residential Gateway Configuration: Status - Connection

http://192.168.1.1:8080/

2 Enter the user name ("user" is the default) password ("1234" is the default) or enter the administrator user name ("webadmin" is the default) and password ("1234" is the default) and click **OK**.



Connect to 192.168.1.1

The server 192.168.1.1 at ZyXEL requires a username and password.

Warning: This server is requesting that your username and password be sent in an insecure manner (basic authentication without a secure connection).

User name:

Password:

□ Remember my password

3 You should now see the main **Status** screen (refer to Figure 4 on page 25).

2.2.1 Logging Out of the Web Configurator

To log out of the Web Configurator - perhaps to log in under a different account - you must close the web browser in which it is displayed and then clear your browser cache. If you do not, then the next time you re-open the web page in that browser you may not have been properly logged out.

For instructions on how to empty your web browser cache, see the documentation that shipped with it.

2.2.2 Resetting the ZyXEL Device

If you forget your password or cannot access the web configurator, you will need to use the **RESET** button at the back of the ZyXEL Device to reload the factory-default configuration file. This means that you will lose all configurations that you had previously and the password will be reset to "1234".

2.2.2.1 Using the RESET Button

1 Make sure the **PWR** and **SYS** LEDs are on (not blinking).

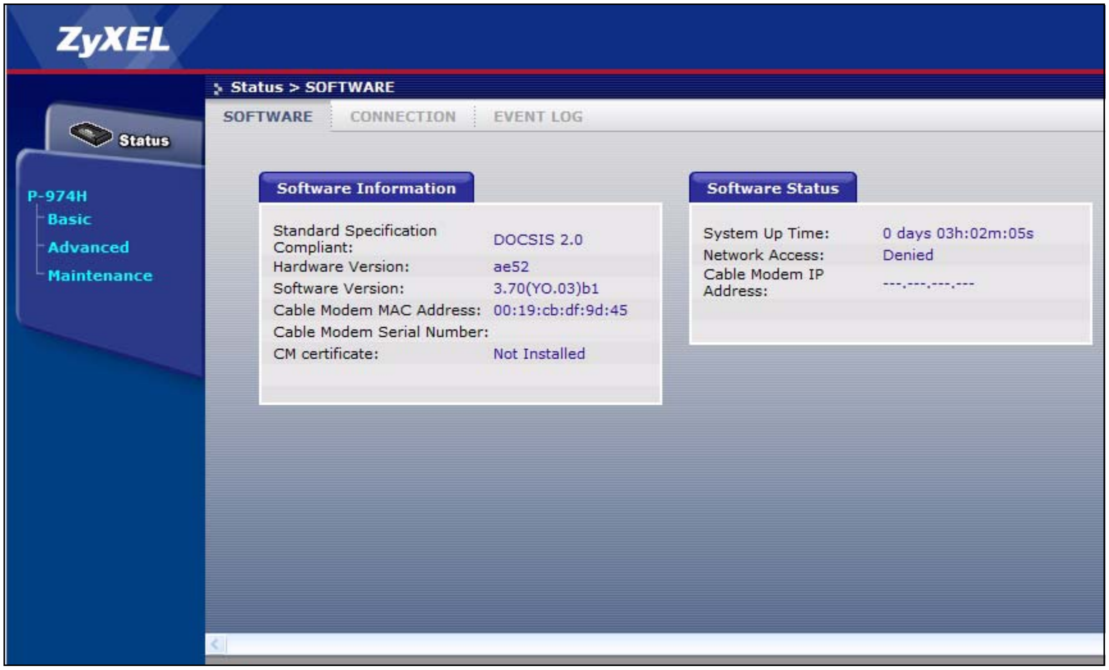
2 Press and hold the **RESET** button for about 15 seconds. All LEDs (except the **WLAN** LED on the P-974HW) should turn on. When you release the **RESET** button, the defaults have been restored and the ZyXEL Device restarts.

You can also use the **RESET** button to restart the ZyXEL Device (without restoring the defaults) by pressing down for 2 to 14 seconds.

2.3 Navigating the Web Configurator

The following summarizes how to navigate the web configurator from the main **Status** screen.

Figure 4 Status



Software Information

Standard Specification Compliant:	DOCSIS 2.0
Hardware Version:	ae52
Software Version:	3.70(YO.03)b1
Cable Modem MAC Address:	00:19:cb:df:9d:45
Cable Modem Serial Number:	
CM certificate:	Not Installed

Software Status

System Up Time:	0 days 03h:02m:05s
Network Access:	Denied
Cable Modem IP Address:	---.---.---.---

Following table lists the menu screens.

Table 2 Web Configurator Screens Summary

LINK	SUB-LINK	FUNCTION
Status	Software	Use this screen to view firmware and system related information.
	Connection	Use this screen to view LAN/WAN/WLAN connection information.
	Event Log	Use this screen to view system logs.
Basic	DHCP	Use this screen to configure DHCP settings on the LAN.

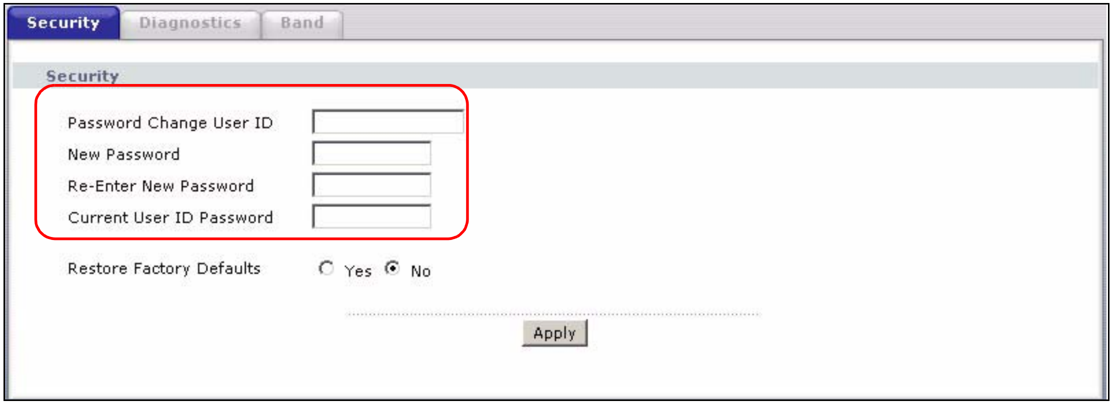
Table 2 Web Configurator Screens Summary (continued)

LINK	SUB-LINK	FUNCTION
Advanced	Options	Use this screen to activate/deactivate WAN features (such as IPSec passthrough and Multicast).
	IP Filtering	Use this screen to block access from one or a range of IP addresses.
	MAC Filtering	Use this screen to block access from the specified MAC address(es).
	Port Filtering	Use this screen to block access from one or a range of ports.
	Forwarding	Use this screen to configure port forwarding on your network.
Wireless (P-974HW Only)	Basic	Use this screen to configure the wireless LAN settings.
	Security	Use this screen to configure WLAN authentication and security settings.
	Access Control	Use this screen to configure MAC filter settings on the ZyXEL Device.
	Bridging	Use this screen to configure WLAN bridging.
Maintenance	Security	Use this screen to change system password or reset the ZyXEL Device back to the factory defaults.
	Diagnostics	These screens display information to help you identify problems with the ZyXEL Device general connection.
	Band	Use this screen to set up scan sets for Internet access providers.

2.4 Changing the Login Password

It is highly recommended that you periodically change the password for accessing the ZyXEL Device. If you didn't change the default one after you logged in or you want to change to a new password again, then click **Maintenance** > **Security** to display the screen as shown next.

Figure 5 Maintenance: Security



Security

Password Change User ID
New Password
Re-Enter New Password
Current User ID Password

Restore Factory Defaults ○ Yes ● No

The following table describes the related labels in this screen.

Table 3 Maintenance: Security

LABEL	DESCRIPTION
Password Change User ID	Enter the login user name whose password you want to change. The default user name is “user”.
New Password	Type the new password in this field. Passwords may be up to 16 characters in length and must be alphanumeric (a-z, A-Z, 0-9), no other characters are allowed.
Re-enter New Password	Type the new password again in this field.
Current User ID Password	Type the default password or the existing password (associated with the user name you enter above) you use to access the system in this field. The default password is “1234”.
Apply	Click **Apply** to save your changes.

3

Status

3.1 Overview

This chapter describes the Status screens you can display to view firmware and system information and system logs.

3.1.1 What You Can Do in This Chapter

- The **Software** screen screen allows you to view the overall status of your device (Section 3.2 on page 31).
- The **Connection** screen displays all of your network connection details (Section 3.3 on page 32).
- The **Event Log** screen provides a composite list of all system even records (Section 3.4 on page 37).

3.1.2 What You Need to Know

The following terms and concepts may help as you read through this chapter.

Acquire Downstream Channel

In order to establish a successful connection with the cable provider's network, the ZyXEL Device must first find and lock onto a frequency for communication with the cable operator's network. The frequency is called a channel. Communication with the cable operator's network cannot proceed until the ZyXEL Device finds the specific channel for sending and receiving data.

Connectivity State

The connectivity state is the current status of the connection between the cable modem and your cable operator. During the initial negotiation with your cable operator's CMTS (Cable Modem Termination System), the ZyXEL Device must establish a clear upstream and downstream channel, which it accomplishes in a series of well defined steps.

To provide Internet access services, a cable provider's CMTS gets the incoming traffic from the ZyXEL Device and routes the traffic to an ISP (Internet Service Provider) to the Internet.

Boot State

When downloading the configuration file and booting, your ZyXEL Device passes through several negotiation stages with the cable operator's CMTS. All communication steps: TFTP, DHCP Offer/Response, and Time Server must complete in order for the configuration to be successful. TFTP is the download protocol used to install the configuration file.

If there is a problem making a TFTP connection with the cable operator's CMTS, you will see the message **Waiting for TFTP**. If the ZyXEL Device does not receive a DHCP offer from the cable operator's CMTS you will see the message **Waiting for DHCP Offer**. Once the ZyXEL Device has responded to the DHCP offer it again waits for a response from the CMTS, if it does not receive a response you will see the message **Waiting for DHCP Response**. If the cable operator's time server does not respond your will see the message **Waiting for Timer Server**. If the download and installation of the configuration file succeeds you will see the message **Operational**.

Your cable modem must receive an offer of a DHCP IP Address from the cable operator's CMTS and respond to that offer in order to set your IP Address. First your cable modem is **Waiting for DHCP Offer**, if the offer is received by your cable modem it responds **Waiting for DHCP Response** to the cable operator's CMTS. Once a response is received your IP Address is set and can be viewed under the **CM IP Address** section of the **Connection** screen or in the **Software** status screen. Note that the DHCP IP Address setting must be completed successfully in order for your cable modem to download the configuration file.

Configuration File

This is the name of the cable modem configuration file downloaded from the cable operator's CMTS using the TFTP protocol. This is a binary format file which must be DOCSIS 2.0 compliant (see RFC 2132 for additional information).

Security

Your cable modem has features built-in to run Baseline Privacy (BP). BP is used as a privacy mechanism to protect user data flowing across the cable network and to prevent unauthorized access to the cable operator's CMTS data flowing across the network. BP also supports access control lists (ACLs), filtering, tunnels, spoof protection, and source IP filtering on the RF subnets to prevent users from using IP addresses that are invalid. BP security information must be included in your cable operator's configuration file to enable security. If your cable operator did not supply this information in the configuration file BP security is **Disabled**. Further information can be found in DOCSIS 2.0.

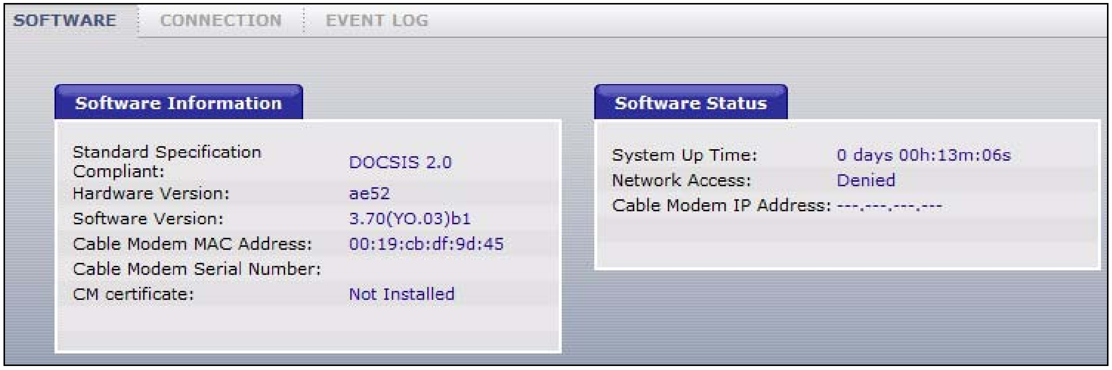
Channels

Your ZyXEL Device uses different communications methods if it is receiving information from the cable operator, or if it is sending information to the cable operator. These are called the **Downstream Channel** and **Upstream Channel** respectively. The channel numbers and frequencies are advertised by the cable operator’s CMTS during the initial booting of the ZyXEL Device; these may also be set in the configuration file.

3.2 Software

Click **Status > SOFTWARE** to display the following screen. These fields are read-only and strictly for diagnostic purposes.

Figure 6 Status: SOFTWARE



Software Information

Standard Specification Compliant: DOCSIS 2.0
Hardware Version: ae52
Software Version: 3.70(YO.03)b1
Cable Modem MAC Address: 00:19:cb:df:9d:45
Cable Modem Serial Number:
CM certificate: Not Installed

Software Status

System Up Time: 0 days 00h:13m:06s
Network Access: Denied
Cable Modem IP Address: ---.---.---.---

The following table describes the labels in this screen.

Table 4 Status: SOFTWARE

LABEL	DESCRIPTION
Software Information	
Standard Specification Compliant	This field displays the name and version of the standard to which the ZyXEL Device is compliant.
Hardware Version	This field displays the hardware version number.
Software Version	This is the firmware version.
Cable Modem MAC Address	This is the MAC (Media Access Control) or Ethernet address unique to your ZyXEL Device.
Cable Modem Serial Number	This is the serial number unique to your device.

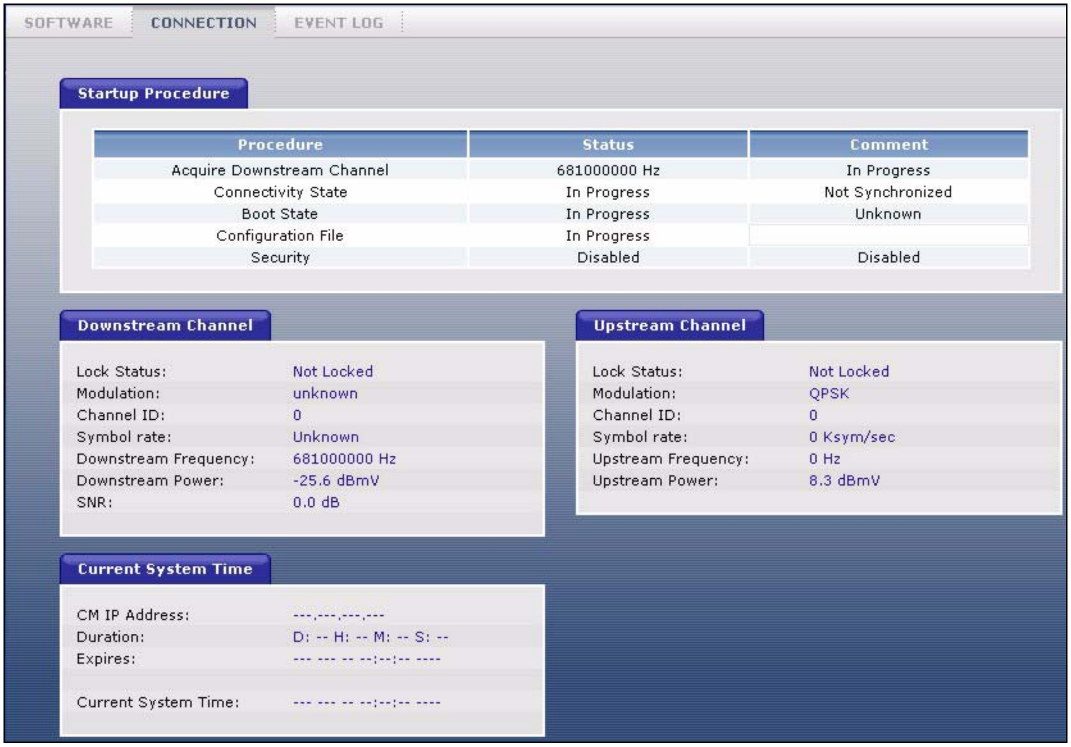
Table 4 Status: SOFTWARE (continued)

LABEL	DESCRIPTION
CM certificate	Authentication certificates are required for the ZyXEL Device to establish a connection to the cable service provider’s network. This field displays whether the authentication certificates are installed on the ZyXEL Device.
Software Status	
System Up Time	This is the elapsed time the system has been up.
Network Access	This field displays whether the ZyXEL Device is registered to the cable service provider’s network.
Cable Modem IP Address	This field displays the WAN IP address.

3.3 Connection

Click **Status > CONNECTION** to display the read-only screen.

Figure 7 Status: CONNECTION



Procedure	Status	Comment
Acquire Downstream Channel	681000000 Hz	In Progress
Connectivity State	In Progress	Not Synchronized
Boot State	In Progress	Unknown
Configuration File	In Progress	
Security	Disabled	Disabled

Downstream Channel

Lock Status:	Not Locked
Modulation:	unknown
Channel ID:	0
Symbol rate:	Unknown
Downstream Frequency:	681000000 Hz
Downstream Power:	-25.6 dBmV
SNR:	0.0 dB

Upstream Channel

Lock Status:	Not Locked
Modulation:	QPSK
Channel ID:	0
Symbol rate:	0 Ksym/sec
Upstream Frequency:	0 Hz
Upstream Power:	8.3 dBmV

Current System Time

CM IP Address:	---.---.---.---
Duration:	D: -- H: -- M: -- S: --
Expires:	--- --- -- --:--:-- ----
Current System Time:	--- --- -- --:--:-- ----

The following table describes the labels in this screen.

Table 5 Status: CONNECTION

LABEL	DESCRIPTION
Startup Procedure	To establish a successful connection to the cable provider's network, the ZyXEL Device must go through a series of well-defined initialization steps. This table shows the line initialization information. For detailed information for each initialization step, refer to Table 6 on page 35.
Procedure	This field displays the name of the initialization step.
Status	This field displays the status of the initialization step.
Comment	This field displays the status message of the initialization step.
Downstream/ Upstream Channel	This is the data path used by the cable operator's CMTS for sending/ receiving information to/from your ZyXEL Device.
Lock Status	The ZyXEL Device is either **Locked** or **Not Locked** on to the channel advertised by the cable operator's CMTS.
Modulation	This is the method used to encode transmission information, similar to FM or AM on your radio. The ZyXEL Device supports **QAM64** (Quadrature Amplitude Modulation) or **QAM256** for the downstream channel. The ZyXEL Device supports **QAM16** or **QPSK** (Quadrature Phase Shift Keying) for the upstream channel.
Channel ID	A standard channel number from the DOCSIS 2.0 specification. Channel numbers and channel frequencies are specified in pairs in DOCSIS 2.0.
Symbol Rate	The symbol rate (in Kilo symbols/second) for communication between the cable operator's CMTS and the ZyXEL Device. This is set during initial configuration with a value supplied by the CMTS. Typical values for QAM64 are 5.05 Mega-symbols/second, and for QAM256 5.36 Mega-symbols/second.
Downstream/ Upstream Frequency	A standard channel frequency (in hertz) from the DOCSIS 2.0 specification.
Downstream/ Upstream Power	The power level (in decibels/mili-volt). This value is set by the cable operator's CMTS.
SNR	This field is applicable for **Downstream Channel**. The SNR (Signal to Noise Ratio), in decibels/mili-volt, is the ratio of signal power to channel noise power. This value is set by the cable operator's CMTS.
Current System Time	
CM IP Address	This is the IP address negotiated with your cable operator, after a successful download of the modem configuration file and DHCP negotiation (e.g.10.21.0.11). This field may also be blanked out with a series of dashed lines (--- --- --- ---) indicating that the modem configuration failed or is in progress; no IP address has been set.

Table 5 Status: CONNECTION (continued)

LABEL	DESCRIPTION
Duration	The IP address negotiated with your cable operator has a default lifetime of 7 days (e.g. D: 00 H: 01 M: 00 S: 00). The sequence (**D -- H -- M -- S --**) indicates that your modem configuration has failed or is in progress; no IP address duration has been set.
Expires	This is the expiration date of the IP address, after installation of the modem configuration file and DHCP negotiation. The default is 7 days (e.g. Wed Jul 02 00:26:23 2005). A sequence of dashes (**--- --- -- -- -- -- ----**) indicates that your modem configuration has failed or is in progress; no IP address expiry date has been set.
Current System Time	This is the current date and time, and is set by your cable operator’s time server.

3.3.0.1 Detailed Startup Procedure Information

The following table describes the status for each initialization step in the **CONNECTION** screen.

Table 6 Status: CONNECTION: Startup Procedure

PROCEDURE	STATUS	COMMENT
Acquire Downstream Channel	The status message will display the frequency in hertz (Hz) of the channel the ZyXEL Device has locked onto or is trying to lock onto.	This field displays: • **Locked** - The ZyXEL Device has locked onto the downstream channel. • **In Progress** - The ZyXEL Device is trying to find a downstream channel.
Connectivity State	This field displays: • **OK** - The ZyXEL Device's cable connection is up and the upstream and downstream channels are established. • **In Progress** - The ZyXEL Device is trying to find and lock onto an upstream channel.	This field displays: • **Not Synchronized** - The ZyXEL Device can not synchronize the QAM signal timing/FEC framing/MPEG packets or obtain downstream channel MAC address. • **Upstream Parameters Acquired** - The ZyXEL Device is trying to obtain the upstream channel information from your cable provider network. • **Ranging Complete** - The ZyXEL Device has successfully adjusted local channel parameters (such as downstream power/ frequency and channel ID) within specified ranges. • **IP Complete** - The ZyXEL Device has successfully obtained a WAN IP address from a DHCP server. • **TOD Established** - (**T**ime **O**f **D**ay) The ZyXEL Device has obtained the system time from a time server. • **Security Established** - The baseline privacy was requested in the configuration file and initialized by the ZyXEL Device. • **Params Transfer Complete** - The ZyXEL Device has received all initialization parameters. • **Registration Complete** - The ZyXEL Device has successfully registered to the cable provider network for Internet access. • **Operational** - The ZyXEL Device is has successfully completed all the initialization steps and is working fine. • **Access Denied** - The ZyXEL Device was unable to perform one or more of the initialization steps.

Table 6 Status: CONNECTION: Startup Procedure (continued)

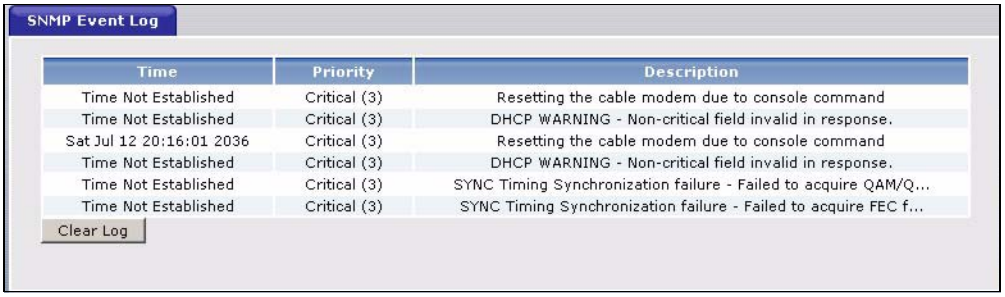
PROCEDURE	STATUS	COMMENT
Boot State	This field displays: • **In Progress** - The ZyXEL Device is in the negotiation process with the cable operator's CMTS. • **OK** - The ZyXEL Device completed configuration.	This field displays: • **Disabled** - The ZyXEL Device's WAN connection has been disabled. • **Waiting for DHCP Offer** - The ZyXEL Device is waiting for a DHCP server to offer it an IP address. • **Waiting for DHCP Response** - The ZyXEL Device is waiting for a response from the DHCP server. • **Waiting for Time Server** - The ZyXEL Device is waiting for a response from the time server. • **Waiting for TFTP** - The ZyXEL Device is waiting for a response from the TFTP server. • **Operational** - The ZyXEL Device has successfully gone through the boot up process. • **Refused by CMTS** - The ZyXEL Device could not complete one of the initialization steps.
Configuration File	This field displays: • **OK** - The ZyXEL Device obtains a configuration file (cmb.cfg) from the cable operator's CMTS, and installs it. • **In Progress** - The ZyXEL Device is trying to obtain a configuration file from the cable operator's CMTS.	This field displays: • The name of the configuration file on the ZyXEL Device. • Nothing if there was a problem in obtaining or installing the configuration file.
Security	This field displays: • **Enabled** - The baseline privacy security is activated on the ZyXEL Device. • **Disabled** - The baseline privacy security is disabled on the ZyXEL Device.	This field displays: • **BPI+** - Baseline Privacy Interface is activated. • **Disabled** - Baseline Privacy is disabled.

3.4 Event Log

The **Event Log** screen displays system logs. The logs are useful for debugging purposes when attempting to troubleshoot a connection problem between your ZyXEL Device and the cable operator’s CMTS.

Click **Status > EVENT LOG** to display the screen as shown.

Figure 8 Status: EVENT LOG



Time	Priority	Description
Time Not Established	Critical (3)	Resetting the cable modem due to console command
Time Not Established	Critical (3)	DHCP WARNING - Non-critical field invalid in response.
Sat Jul 12 20:16:01 2036	Critical (3)	Resetting the cable modem due to console command
Time Not Established	Critical (3)	DHCP WARNING - Non-critical field invalid in response.
Time Not Established	Critical (3)	SYNC Timing Synchronization failure - Failed to acquire QAM/Q...
Time Not Established	Critical (3)	SYNC Timing Synchronization failure - Failed to acquire FEC f...

The following table describes the labels in this screen.

Table 7 Status: EVENT LOG

LABEL	DESCRIPTION
Time	This field displays the name of the log and the time created.
Priority	This field displays the severity level of the log.
Description	This field displays detailed information about the log.
Clear Log	Click **Clear Log** to erase the log(s) in this screen.

The following table describes the log severity levels in the **Priority** field.

Table 8 Event Log: Severity Levels

ERROR	LEVEL	DESCRIPTION
Emergency	1	The event log requires immediate attention. Problems resulting from this event may affect your Internet access connection.
Alert	2	A system or connection failure has occurred.
Critical	3	Action(s) should be taken to avoid a system or connection failure.
Error	4	Action(s) should be taken to avoid possible future system or connection failures.
Warning	5	Failure to solve this warning can lead to further system problems,
Notice	6	Normal status. System administrators take notice.
Informational	7	Informational message only. May or may not be significant.
Debug	8	System debugging is turned on.

3.4.1 Event Log: Log Description

The following table describes the logs. Refer to DOCSIS 2.0 for additional information on SNMP status messages for cable modems.

Table 9 Event Log: Log Description

LOG NAME	SEVERITY	DESCRIPTION
DHCP Warning - Non-critical field invalid in response	Critical	The ZyXEL Device has received a response to its DHCP request from the cable operator's CMTS, but the responding DHCP server did not include all of the required fields in the message. This message might also appear if one of the required fields in the DHCP message contains an invalid value. Reconfigure the DHCP server so that it sends all of the required fields.
DHCP ERROR - The DHCP response does not contain all of the required fields or the PS (Portal Services) is unable to determine provisioning mode.	Critical	The ZyXEL Device has received a response to its DHCP request from the cable operator's CMTS, but the responding DHCP server did not include all of the required fields in the message. Please refer to appendix C of the DOCSIS 1.0 RF specification**,** appendix D of the DOCSIS 1.1 RF specification, appendix D of the DOCSIS 2.0 RF specification, and RFC 868 for further information. Reconfigure the DHCP server so that it sends all of the required fields.
SYNC Timing Synchronization failure - Failed to acquire FEC framing	Critical	When attempting to lock on to the downstream channel your ZyXEL Device could not acquire forward error correction (FEC) framing.
SYNC Timing Synchronization failure - Failed to acquire MAC framing	Critical	Your ZyXEL Device attempted to lock on to the downstream channel and was able to acquire forward error correction (FEC) framing, but then failed to lock on to media access control (MAC) framing. Note that this is not an ethernet MAC frametype.
SYNC Timing Synchronization failure, Acquired FEC framing - Failed to acquire MPEG2 Sync	Critical	Your ZyXEL Device attempted to lock on to the downstream channel and was able to acquire forward error correction (FEC) framing, but then failed to lock on to the MPEG2 synchronization signal.
SYNC Timing Synchronization failure - Failed to acquire QAM/ QPSK symbol timing	Critical	Your ZyXEL Device could not lock on to the downstream channel's quadrature amplitude modulation/quadrature phase shift keying (QAM)/(QPSK) signal.
SYNC Timing Synchronization failure - Failed to receive MAC SYNC frame within time-out period	Critical	Your ZyXEL Device was able to acquire the media access control (MAC) framing initially, but subsequently failed to receive the MAC SYNC frame within the specified timeout period. Note that this is not an ethernet MAC frame type.

Table 9 Event Log: Log Description (continued)

LOG NAME	SEVERITY	DESCRIPTION
SW Upgrade Failed Before Download - Server not Present	Error	Your ZyXEL Device has made 16 unsuccessful attempts to download a new ZyXEL software image from the TFTP server (CMTS or other TFTP server). After 16 attempts your cable modem aborts the upgrade procedure. This error message might also occur if your cable modem has received a fatal TFTP server error.
SW upgrade Failed after download - Incompatible SW file	Error	An upgrade of your ZyXEL Device software failed because the downloaded image file was either the wrong image, type, or was corrupted during file transfer.
UCD invalid or channel unusable	Critical	The cable modem received an Upstream Channel Descriptor (UCD) message from the CMTS, but it contains invalid information or specifies an upstream channel that is unusable.
A transmit opportunity was missed because the MAP arrived too late	Information	Your ZyXEL Device missed a transmit opportunity because the Bandwidth Allocation MAP (one slot of the Time Division Multiplexing) signal arrived too late for your ZyXEL Device to use it.
DHCP FAILED - Discover sent, no offer received	Critical	Your ZyXEL Device sent a DHCP discovery broadcast message to the cable operator’s CMTS, but no DHCP server or DHCP relay agent replied with a DHCP offer response message.
DHCP FAILED - Request sent, No response	Critical	Your ZyXEL Device sent a DHCP discovery broadcast message to the cable operator’s CMTS, and received a DHCP offer message in response from the cable operator, but when it sent a DHCP request message to the indicated DHCP server, it did not receive a DHCP response message.
No UCD's Received - Timeout	Critical	Your ZyXEL Device has not received any periodic Upstream Channel Descriptor (UCD) messages from the CMTS within the specified timeout period.
Unicast Ranging Received Abort Response - Re-initializing MAC	Critical	Your ZyXEL Device is online and has sent a periodic Ranging Request (RNG-REQ) message to the CMTS, but it received an Abort Ranging reply instead. Your ZyXEL Device will reset its cable interface and restart the registration process in response. Note that this is not an ethernet MAC frame type.
SYNC Timing Synchronization failure - Loss of Sync	Critical	Your ZyXEL Device had locked on to the downstream channel for a period of time, but then the channel lock was lost and it was unable to be reacquired within five SYNC signal periods. Your ZyXEL Device has reset its cable interface in response to this condition.
No Maintenance Broadcasts for Ranging opportunities received - T2 time-out	Critical	Your ZyXEL Device did not receive a broadcast maintenance opportunity in which to transmit a Ranging Request (RNG-REQ) within the required T2 timeout period (approximately 10 seconds). Your ZyXEL Device will reset its cable interface and restart the registration process.

Table 9 Event Log: Log Description (continued)

LOG NAME	SEVERITY	DESCRIPTION
Init RANGING Critical Ranging Request Retries exhausted	Critical	Your ZyXEL Device has sent 16 Ranging Request (RNG-REQ) messages without receiving a Ranging Response (RNG-RSP) reply message from your cable operator's CMTS. Your ZyXEL Device will reset its cable interface and restart the registration process. This error message is typically caused by noise on the upstream channel that causes the loss of MAC-layer messages. If your ZyXEL Device cannot raise its upstream channel transmit power to a level that allows successful communication within the maximum timeout period, it resets its cable interface and restarts the registration process.
Received Response to Broadcast Maintenance Request, But no Unicast Maintenance opportunities received - T4 timeout	Critical	Your ZyXEL Device did not received a station maintenance opportunity in which to transmit a Ranging Request (RNG-REQ) message within the required T4 timeout period (30 to 35 seconds). Your ZyXEL Device will reset its cable interface and restart the registration process. Typically, this indicates an occasional, temporary loss of service, but if the problem persists, check for possible service outages or maintenance activity on the part of your cable operator.
No Ranging Response received - T3 time-out	Critical	Your ZyXEL Device sent a Ranging Request (RNG-REQ) message as part of its initial ranging process, but did not receive a Ranging Response (RNG-RSP) message from the CMTS within the required T3 timeout period. Your ZyXEL Device will adjust its upstream channel transmit power and send another RNG-REQ message, up to the maximum of 16 successive attempts, or until it reaches the maximum transmit power level.
Started Unicast Maintenance Ranging - No Response received - T3 time-out	Critical	Your ZyXEL Device is online and has sent a periodic Ranging Request (RNG-REQ) message to the CMTS, without receiving a Ranging Response (RNG-RSP) message from the CMTS within the required T3 timeout period. Your ZyXEL Device will send another RNG-REQ message, up to the maximum of 16 successive attempts.
TFTP Failed - OUT OF ORDER packets	Critical	Your ZyXEL Device attempted to download its DOCSIS compliant configuration file from the TFTP server, but the download failed because the ZyXEL Device received at least one packet that was out of order.
TFTP file complete - but failed Message Integrity check MIC	Critical	Your ZyXEL Device successfully downloaded its configuration file, but the Message Integrity Check (MIC) field sent with the configuration file does not match the one that your ZyXEL Device generated internally after checking the file's contents. This could indicate either that the configuration file was corrupted during file transfer, or that the software tool that generated the configuration file was not performing up to the DOCSIS standard. This message may also indicate that a malicious user is attempting to download their own configuration file as part of a theft-of-service attempt.
TFTP failed - request sent - No Response	Critical	Your ZyXEL Device attempted to download the configuration file from the TFTP server specified by the DHCP server, but the TFTP server has not replied.
TFTP failed - configuration file NOT FOUND	Critical	Your ZyXEL Device attempted to download its configuration file from the TFTP server specified by the DHCP server, but the TFTP server replied that it could not find the requested file.

Table 9 Event Log: Log Description (continued)

LOG NAME	SEVERITY	DESCRIPTION
ToD request sent - No Response received	Warning	Your ZyXEL Device sent a request to the time-of-day (ToD) server specified by the DHCP server, but it did not receive a reply within the specified timeout period. Your ZyXEL Device defaults to setting its onboard clock to midnight on January 1, 1970. Your ZyXEL Device can now proceed with the registration process without receiving a ToD response, but will continue trying to contact the ToD server every 5 minutes until it receives a valid response.
ToD Response received - Invalid data format	Warning	Your ZyXEL Device received a reply from the ToD server that was specified by the DHCP server. The reply from the ToD server was either an empty datagram or it contained invalid data (the ToD server should send a reply that contains only one 32-bit number that indicates the number of seconds since midnight on January 1, 1900). Please refer to RFC 868, Time Protocol for additional information. The DOCSIS specifications do not allow the use of the Network Time Protocol (NTP) or Simple Network Time Protocol (SNTP) ToD servers to set your ZyXEL Device's system time.
UCC- REQ received with invalid or out of range US channel ID	Error	Your ZyXEL Device has received an Upstream Channel Change Request (UCC-REQ) message from your cable operator's CMTS that contains an upstream channel ID that is either invalid or out of range.
UCC- REQ received unable to send UCC-RSP, no TX opportunity	Error	Your ZyXEL Device has received an Upstream Channel Change Request (UCC-REQ) message from your cable operator's CMTS, but could not reply with an UCC Response message (UCC-RSP) because it could not obtain a transmit timeslot.
US channel wide parameters not set before Burst Descriptors	Critical	Your ZyXEL Device has received an Upstream Channel Descriptor (UCD) message from the CMTS, but it did not set the channel and symbol rate parameters before beginning the set of TLVs (Type Length Value) that specify the burst descriptors for the upstream channel. TLVs are an encoding for three fields: the first field is the type of element, the second field is the length of the element, and the third filed is the value of the element.
UCD & SYNC valid - NO MAPS for this channel	Critical	Your ZyXEL Device has received valid Upstream Channel Descriptor (UCD) and SYNC messages from the CMTS, but the upstream channel that is specified in the UCD does not offer your ZyXEL Device any MAP (one slot of the Time Division Multiplexing) minislots in which to transmit.

4

Basic

4.1 Overview

This chapter describes the screen you use to enable and configure your DHCP server.

4.1.1 What You Can Do in This Chapter

The **DHCP** screen allows you to configure DHCP and IP address settings on the LAN (Section 4.2 on page 44).

4.1.2 What You Need to Know

The following terms and concepts may help as you read through this chapter.

IP Address

A static IP is a fixed IP that you configure on the ZyXEL Device. A dynamic IP is not fixed; a DHCP server provides an IP address to an Ethernet device each time it connects to the network. When an Ethernet device is configured to obtain a dynamic IP address from a DHCP server, it is known as a DHCP client.

DHCP

DHCP (Dynamic Host Configuration Protocol, RFC 2131 and RFC 2132) allows individual clients to obtain TCP/IP configuration at start-up from a server. You can configure the ZyXEL Device as a DHCP server or disable it on the LAN. When configured as a server, the ZyXEL Device provides the TCP/IP configuration for the DHCP clients. If DHCP service is disabled, you must have another DHCP server on your LAN, or else the computers must be manually configured.

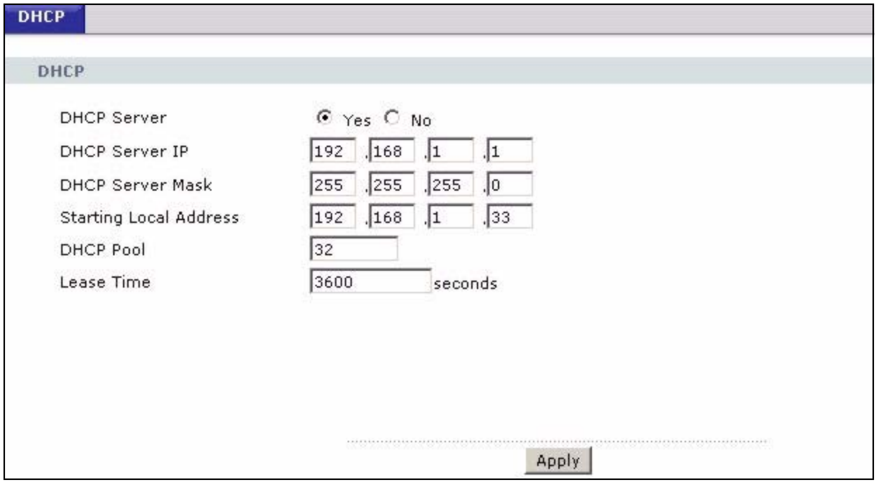
IP Pool Setup

You can configure the starting IP address that the ZyXEL Device assigns to clients as well as limit the number of devices which can obtain an IP address from the ZyXEL Device.

4.2 DHCP

Click **Basic > DHCP** to display the configuration screen. Use this screen to configure DHCP and IP address settings on the LAN.

Figure 9 Basic: DHCP



DHCP Server ● Yes ○ No
DHCP Server IP 192 .168 .1 .1
DHCP Server Mask 255 .255 .255 .0
Starting Local Address 192 .168 .1 .33
DHCP Pool 32
Lease Time 3600 seconds

The following table describes the labels in this screen.

Table 10 Basic: DHCP

LABEL	DESCRIPTION
DHCP	
DHCP Server	Select **Yes** to set the ZyXEL Device as a DHCP server. Otherwise, select **No**.
DHCP Server IP	Enter the LAN IP address of the ZyXEL Device in the fields provided.
DHCP Server Mask	Enter the subnet mask associated with the LAN IP address.
Starting Local Address	Specify the first of the contiguous addresses in the IP address pool.
DHCP Pools	Specify the number of IP addresses that the ZyXEL Device will give out to DHCP clients.
Lease Time	Specify the time (in minutes between 1 and 71582788) a DHCP client is allowed to use an assigned IP address. When the lease time expires, the DHCP client is given a new, unused IP address.
Apply	Click **Apply** to save the settings.

5

Advanced

5.1 Overview

This chapter describes the Advanced screens you use to configure settings such as IP filtering, MAC filtering and port forwarding.

Use the **Advanced** screens to configure VPN passthrough, enable multicast, filtering, and set up Network Address Translation (NAT) features.

5.1.1 What You Can Do in this Chapter

- The **Options** screen allows you to enable or disable advanced features such as multicast and IPSec (Section 5.2 on page 46).
- The **IP Filtering** screen allows you to block access based on the IP address of a computer on the LAN (Section 5.3 on page 47).
- The **MAC Filtering** screen allows you to block access based on the MAC address of a computer on the LAN (Section 5.4 on page 48).
- The **Port Filtering** screen allows you to drop traffic based on service port numbers and protocol types (Section 5.5 on page 49).
- The **Port Forwarding** screen allows you to forward traffic to certain computers on your network based on the port numbers of incoming traffic (Section 5.6 on page 50).

5.1.2 What You Need to Know

The following terms and concepts may help as you read through this chapter.

VPN Pass Through Features

A Virtual Private Network (VPN) is a way to securely connect two networks over the Internet. For example a home network and one in a business office. This requires special equipment on both ends of the connection.

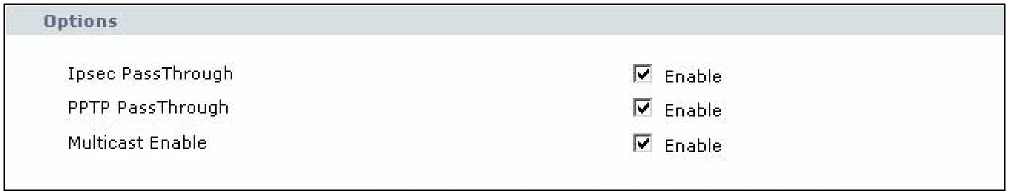
The ZyXEL Device is not one of the endpoints but it does allow traffic from those endpoints to pass through. The ZyXEL Device allows the following types of VPN traffic to pass through:

- IP security (IPSec)
- Point-to-Point Tunneling Protocol (PPTP)

5.2 Options

Use the **Options** screen to enable or disable advanced features (such as multicast and IPSec).

Figure 10 Advanced: Options



Options

Ipsec PassThrough ☑ Enable

PPTP PassThrough ☑ Enable

Multicast Enable ☑ Enable

The following table describes the labels in this screen.

Table 11 Advanced: Options

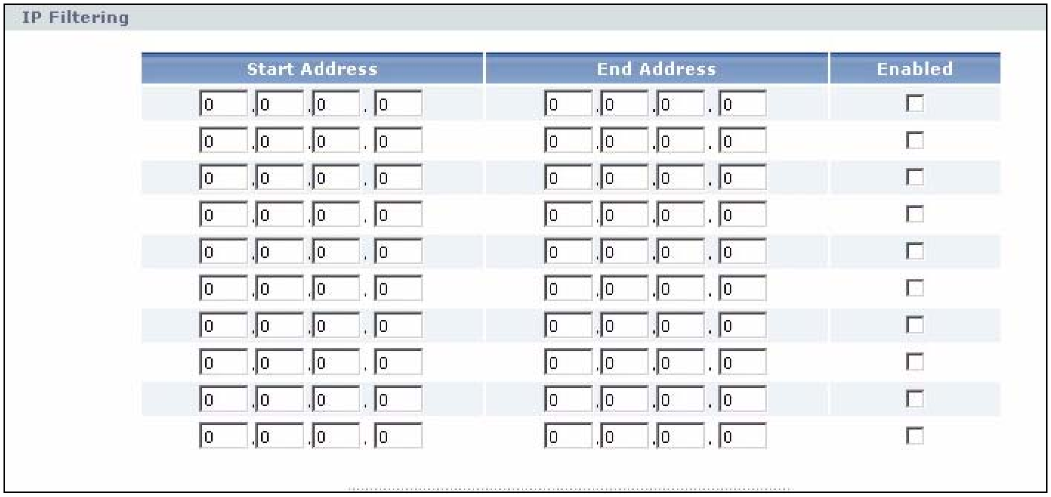
LABEL	DESCRIPTION
Ipsec PassThrough	Select this option to allow the ZyXEL Device to pass through VPN traffic using the IPsec protocol. Clear this option to disallow this type of VPN traffic.
PPTP PassThrough	Select this option to allow the ZyXEL Device to pass through VPN traffic using PPTP. Clear this option to disallow this type of VPN traffic.
Multicast Enable	Select this option to set the ZyXEL Device to forward multicast traffic. The ZyXEL Device acts as an Internet Group Management Protocol (IGMP) proxy and forwards multicast streams to multicast group members on your network.
Apply	Click **Apply** to save the settings.

5.3 IP Filtering

You can set the ZyXEL Device to block access based on the IP address of a computer on the LAN. Computers whose IP addresses are specified in the **IP Filtering** screen are denied access to the ZyXEL Device and the Internet.

Click **Advanced > IP Filtering** to display the configuration screen.

Figure 11 Advanced: IP Filtering



IP Filtering

Start Address	End Address	Enabled
0 . 0 . 0 . 0	0 . 0 . 0 . 0	□
0 . 0 . 0 . 0	0 . 0 . 0 . 0	□
0 . 0 . 0 . 0	0 . 0 . 0 . 0	□
0 . 0 . 0 . 0	0 . 0 . 0 . 0	□
0 . 0 . 0 . 0	0 . 0 . 0 . 0	□
0 . 0 . 0 . 0	0 . 0 . 0 . 0	□
0 . 0 . 0 . 0	0 . 0 . 0 . 0	□
0 . 0 . 0 . 0	0 . 0 . 0 . 0	□
0 . 0 . 0 . 0	0 . 0 . 0 . 0	□
0 . 0 . 0 . 0	0 . 0 . 0 . 0	□

The following table describes the labels in this screen.

Table 12 Advanced: IP Filtering

LABEL	DESCRIPTION
Start Address	Enter the IP address of a computer (or the beginning IP address of a specific range of computers) on the LAN that you want the ZyXEL Device to deny access.
End Address	Type the ending IP address of a specific range of users on your LAN that you want the ZyXEL Device to deny access. If you want to exclude only one computer, enter the same IP address as in the **Start Address** field above.
Enable	Select **Enable** to block the computer(s) with the IP address(es) from accessing the ZyXEL Device and/or the Internet.
Apply	Click **Apply** to save the settings.

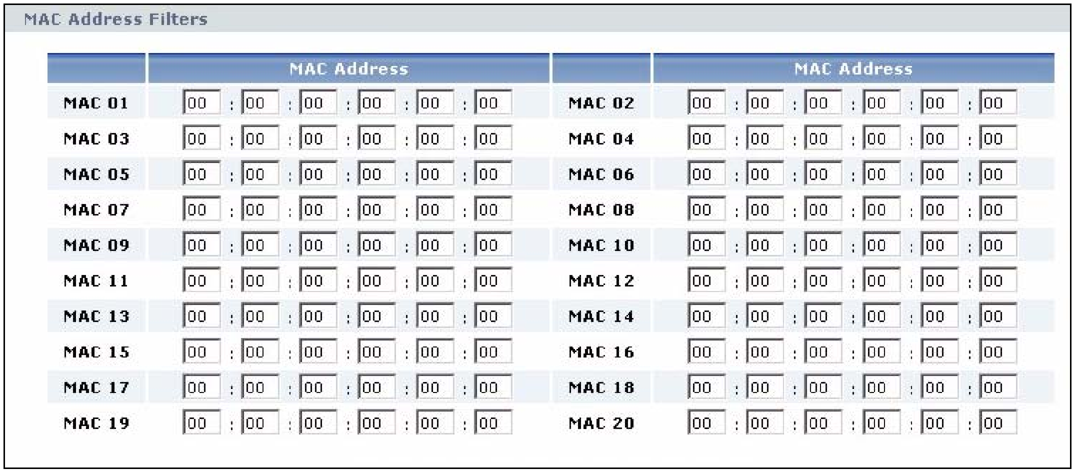
5.4 MAC Filtering

You can set the ZyXEL Device to block access based on the Media Access Control (MAC) address of a computer on the LAN. Every Ethernet device has a unique MAC address. The MAC address is assigned at the factory and consists of six pairs of hexadecimal characters, for example “00:AC:12:00:01:15”.

Computers whose MAC addresses are specified in the **MAC Filtering** screen are denied access to the ZyXEL Device and the Internet.

Click **Advanced > MAC Filtering** to display the configuration screen.

Figure 12 Advanced: MAC Filtering



MAC Address Filters

	MAC Address		MAC Address
MAC 01	00 : 00 : 00 : 00 : 00 : 00	MAC 02	00 : 00 : 00 : 00 : 00 : 00
MAC 03	00 : 00 : 00 : 00 : 00 : 00	MAC 04	00 : 00 : 00 : 00 : 00 : 00
MAC 05	00 : 00 : 00 : 00 : 00 : 00	MAC 06	00 : 00 : 00 : 00 : 00 : 00
MAC 07	00 : 00 : 00 : 00 : 00 : 00	MAC 08	00 : 00 : 00 : 00 : 00 : 00
MAC 09	00 : 00 : 00 : 00 : 00 : 00	MAC 10	00 : 00 : 00 : 00 : 00 : 00
MAC 11	00 : 00 : 00 : 00 : 00 : 00	MAC 12	00 : 00 : 00 : 00 : 00 : 00
MAC 13	00 : 00 : 00 : 00 : 00 : 00	MAC 14	00 : 00 : 00 : 00 : 00 : 00
MAC 15	00 : 00 : 00 : 00 : 00 : 00	MAC 16	00 : 00 : 00 : 00 : 00 : 00
MAC 17	00 : 00 : 00 : 00 : 00 : 00	MAC 18	00 : 00 : 00 : 00 : 00 : 00
MAC 19	00 : 00 : 00 : 00 : 00 : 00	MAC 20	00 : 00 : 00 : 00 : 00 : 00

The following table describes the labels in this screen.

Table 13 Advanced: MAC Filtering

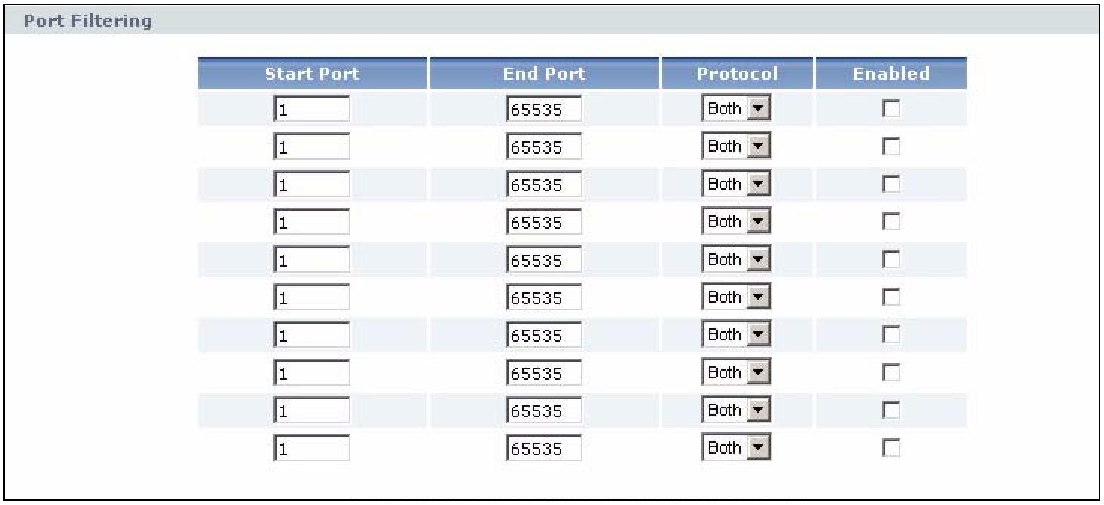
LABEL	DESCRIPTION
MAC Address	Enter the MAC address of a computer you want the ZyXEL Device to deny access.
Apply	Click **Apply** to save the changes.

5.5 Port Filtering

You can set the ZyXEL Device to drop traffic based on service port numbers and protocol types. This feature allows you to specify the applications (such as MSN and TFTP) the computers on the LAN cannot use. See Appendix D on page 99 for common services.

Click **Advanced > Port Filtering** to display the configuration screen.

Figure 13 Advanced: Port Filtering



Port Filtering

Start Port	End Port	Protocol	Enabled
1	65535	Both	□
1	65535	Both	□
1	65535	Both	□
1	65535	Both	□
1	65535	Both	□
1	65535	Both	□
1	65535	Both	□
1	65535	Both	□
1	65535	Both	□
1	65535	Both	□

The following table describes the labels in this screen.

Table 14 Advanced: Port Filtering

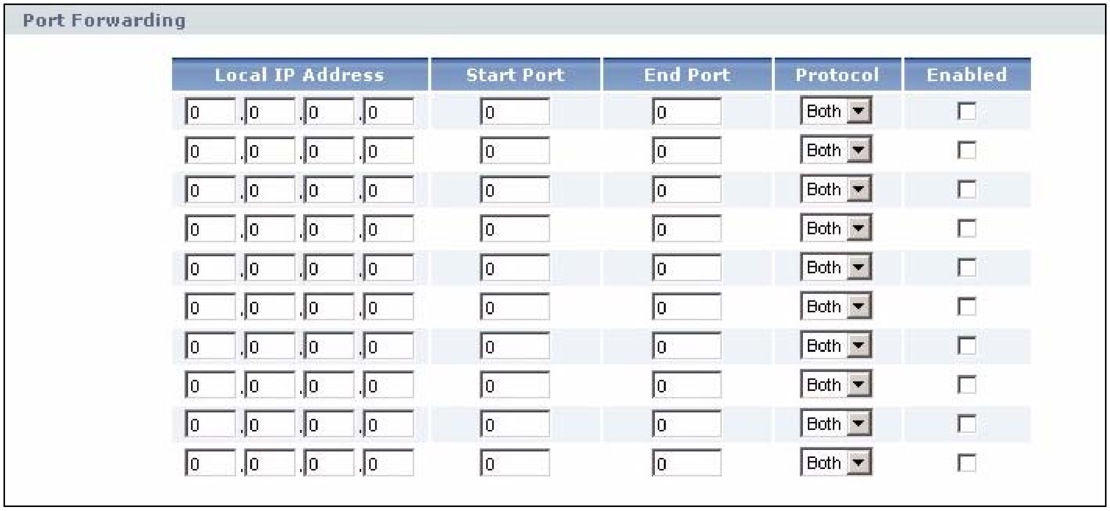
LABEL	DESCRIPTION
Start Port	Enter the beginning service port number whose traffic you want the ZyXEL Device to block.
End Port	Type the ending service port number whose traffic you want the ZyXEL Device to block. If you want to exclude only one service, enter the same service port number as in the **Start Port** field above.
Protocol	Specify the traffic protocol type. Choices are **TCP**, **UDP** and **Both**.
Enabled	Select **Enabled** to block traffic based on the selected port number(s) and protocol type.
Apply	Click **Apply** to save the settings.

5.6 Port Forwarding

You can set the ZyXEL Device to forward traffic to certain computers on your network based on the port numbers of incoming traffic. For example, if you set up an FTP server on your local network and you want it be available from the outside your LAN. You can set up a forwarding rule that will send all FTP traffic coming from the WAN to the FTP server on your network. Refer to Appendix D on page 99 for common port numbers and their associated services.

Click **Advanced > Forwarding** to display the configuration screen.

Figure 14 Advanced: Forwarding



Port Forwarding

Local IP Address	Start Port	End Port	Protocol	Enabled
0 .0 .0 .0	0	0	Both	□
0 .0 .0 .0	0	0	Both	□
0 .0 .0 .0	0	0	Both	□
0 .0 .0 .0	0	0	Both	□
0 .0 .0 .0	0	0	Both	□
0 .0 .0 .0	0	0	Both	□
0 .0 .0 .0	0	0	Both	□
0 .0 .0 .0	0	0	Both	□
0 .0 .0 .0	0	0	Both	□
0 .0 .0 .0	0	0	Both	□

The following table describes the labels in this screen.

Table 15 Advanced: Forwarding

LABEL	DESCRIPTION
Local IP Address	Enter the IP address of a server or computer to which you want to forward traffic incoming on the ports you specify.
Start Port	Type the starting service port number whose traffic you want the ZyXEL Device to forward to the IP address you specified in the **Local IP Address** field.
End Port	Type the ending service port number whose traffic you want the ZyXEL Device to forward to the IP address you specified in the **Local IP Address** field. If you want to forward only one service, enter the same service port number as in the **Start Port** field above.
Protocol	Specify the traffic protocol type. Choices are **TCP**, **UDP** and **Both**.
Enabled	Select **Enabled** to forward traffic based on the selected port number(s) and protocol type.
Apply	Click **Apply** to save the settings.

6

Wireless LAN

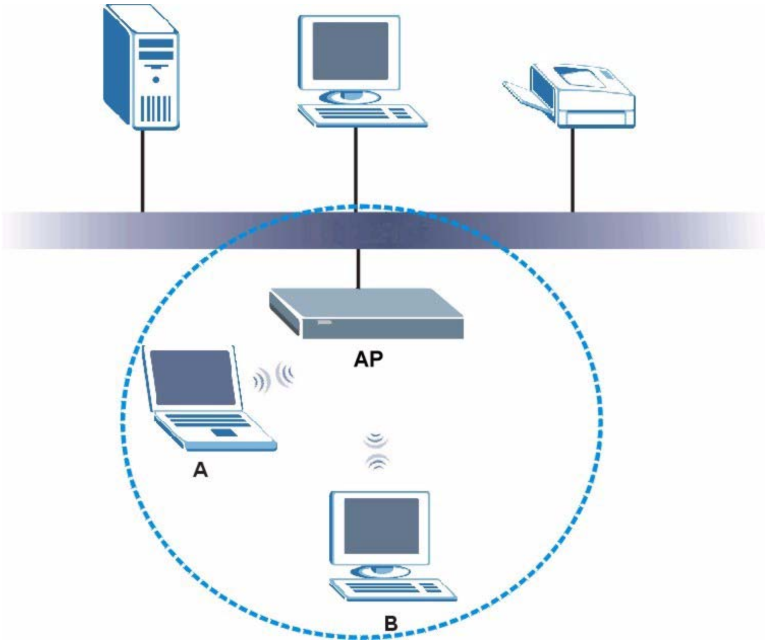
6.1 Overview

This chapter discusses how to configure the wireless network settings in your ZyXEL Device.

Note: This chapter is only applicable to the P-974HW model.

The following figure provides an example of a wireless network.

Figure 15 Example of a Wireless Network



The wireless network is the part in the blue circle. In this wireless network, devices **A** and **B** use the access point (**AP**) to interact with the other devices (such as the printer) or with the Internet. Your ZyXEL Device is the AP.

Every wireless network must follow these basic guidelines.

- Every device in the same wireless network must use the same SSID.

  The SSID is the name of the wireless network. It stands for Service Set IDentity.
- If two wireless networks overlap, they should use a different channel.

  Like radio stations or television channels, each wireless network uses a specific channel, or frequency, to send and receive information.
- Every device in the same wireless network must use security compatible with the AP.

  Security stops unauthorized devices from using the wireless network. It can also protect the information that is sent in the wireless network.

6.1.1 What You Need to Know

The following terms and concepts may help as you read through this chapter.

SSID

Normally, the ZyXEL Device acts like a beacon and regularly broadcasts the SSID in the area. You can hide the SSID instead, in which case the ZyXEL Device does not broadcast the SSID. In addition, you should change the default SSID to something that is difficult to guess.

This type of security is fairly weak, however, because there are ways for unauthorized wireless devices to get the SSID. In addition, unauthorized wireless devices can still see the information that is sent in the wireless network.

MAC Address Filter

Every device that can use a wireless network has a unique identification number, called a MAC address.[1] A MAC address is usually written using twelve hexadecimal characters[2]; for example, 00A0C5000002 or 00:A0:C5:00:00:02. To get the MAC address for each device in the wireless network, see the device’s User’s Guide or other documentation.

You can use the **Access Control** screen to tell the ZyXEL Device which devices are allowed or not allowed to use the wireless network. If a device is allowed to use the wireless network, it still has to have the correct information (SSID, channel, and security). If a device is not allowed to use the wireless network, it does not matter if it has the correct information.

This type of security does not protect the information that is sent in the wireless network. Furthermore, there are ways for unauthorized wireless devices to get the

[1] Some wireless devices, such as scanners, can detect wireless networks but cannot use wireless networks. These kinds of wireless devices might not have MAC addresses.

[2] Hexadecimal characters are 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, A, B, C, D, E, and F.

MAC address of an authorized device. Then, they can use that MAC address to use the wireless network.

User Authentication

You can make every user log in to the wireless network before they can use it. This is called user authentication. However, every device in the wireless network has to support IEEE 802.1x to do this.

You need to configure a RADIUS server to set up user names and passwords for your users.

Unauthorized wireless devices can still see the information that is sent in the wireless network, even if they cannot use the wireless network. Furthermore, there are ways for unauthorized wireless users to get a valid user name and password. Then, they can use that user name and password to use the wireless network.

Encryption

Wireless networks can use encryption to protect the information that is sent in the wireless network. Encryption is like a secret code. If you do not know the secret code, you cannot understand the message.

The types of encryption you can choose depend on the type of authentication. (See Section on page 53 for information about this.)

Table 16 Types of Encryption for Each Type of Authentication

	NO AUTHENTICATION	RADIUS SERVER
Weakest	None	**IEEE 802.1x**
↕	**Static WEP**	**IEEE 802.1x + Static WEP**
	WPA-PSK	**WPA**
Strongest	**WPA2-PSK**	**WPA2**

For example, if the wireless network has a RADIUS server, you can choose **IEEE 802.1x**, **IEEE 802.1x + WEP**, **WPA** or **WPA2**. If users do not log in to the wireless network, you can choose **WEP**, **WPA-PSK**, or **WPA2-PSK**.

Usually, you should set up the strongest encryption that every device in the wireless network supports. For example, suppose you have a wireless network with the ZyXEL Device. The ZyXEL Device does not have a local user database, and you do not have a RADIUS server. Therefore, there is no authentication. Suppose the wireless network has two devices. Device A only supports WEP, and device B supports WEP and WPA. Therefore, you should set up **WEP** in the wireless network.

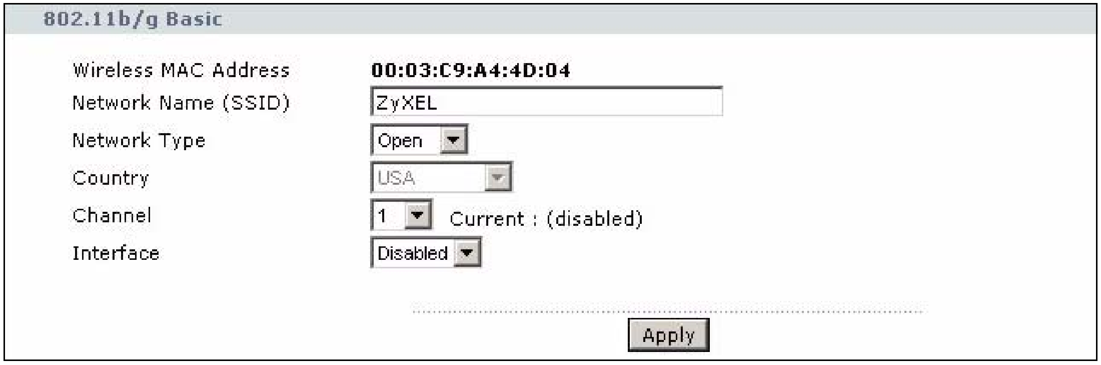
Note: It is recommended that wireless networks use **WPA-PSK**, **WPA**, or stronger encryption. IEEE 802.1x and WEP encryption are better than none at all, but it is still possible for unauthorized wireless devices to figure out the original information pretty quickly.

Many types of encryption use a key to protect the information in the wireless network. The longer the key, the stronger the encryption. Every device in the wireless network must have the same key.

6.2 Basic WLAN Settings

To configure general WLAN settings, click **WLAN > Basic** to display the configuration screen.

Figure 16 Wireless: Basic



802.11b/g Basic

Wireless MAC Address	00:03:C9:A4:4D:04
Network Name (SSID)	ZyXEL
Network Type	Open
Country	USA
Channel	1 Current : (disabled)
Interface	Disabled

The following table describes the labels in this screen.

Table 17 Wireless: Basic

LABEL	DESCRIPTION
802.1b/g Basic	
Wireless MAC Address	This read-only field displays the MAC address of the built-in WLAN card.
Network Name (SSID)	The SSID (Service Set IDentification) is a unique name to identify the ZyXEL Device in the wireless LAN. Wireless stations associating to the ZyXEL Device must have the same SSID. Enter a descriptive name of up to 32 printable characters (including spaces; alphabetic characters are case-sensitive).
Network Type	Select **Open** to make the SSID visible so a station can obtain the SSID through AP scanning. Select **Closed** to hide the SSID so a station cannot obtain the SSID through AP scanning.
Country	Select your country location in this field. The number of channels available in the **Channel** field vary depending on the country location you select in this field.

Table 17 Wireless: Basic (continued)

LABEL	DESCRIPTION
Channel	The radio frequency used by wireless devices is called a channel. Select a channel from the drop-down list box. The number of channels available vary depending on what you select in the **Country** field.
Interface	You should configure wireless security when you enable the wireless LAN. Select **Enable** to activate the wireless LAN, otherwise select **Disable** to deacitvate the wireless LAN.
Apply	Click **Apply** to save the settings.

6.3 Wireless LAN Security

Wireless security is vital to your network to protect wireless communication between wireless stations, access points and the wired network.

Wireless security methods available on the ZyXEL Device are data encryption, wireless client authentication, restricting access by device MAC address and hiding the ZyXEL Device identity.

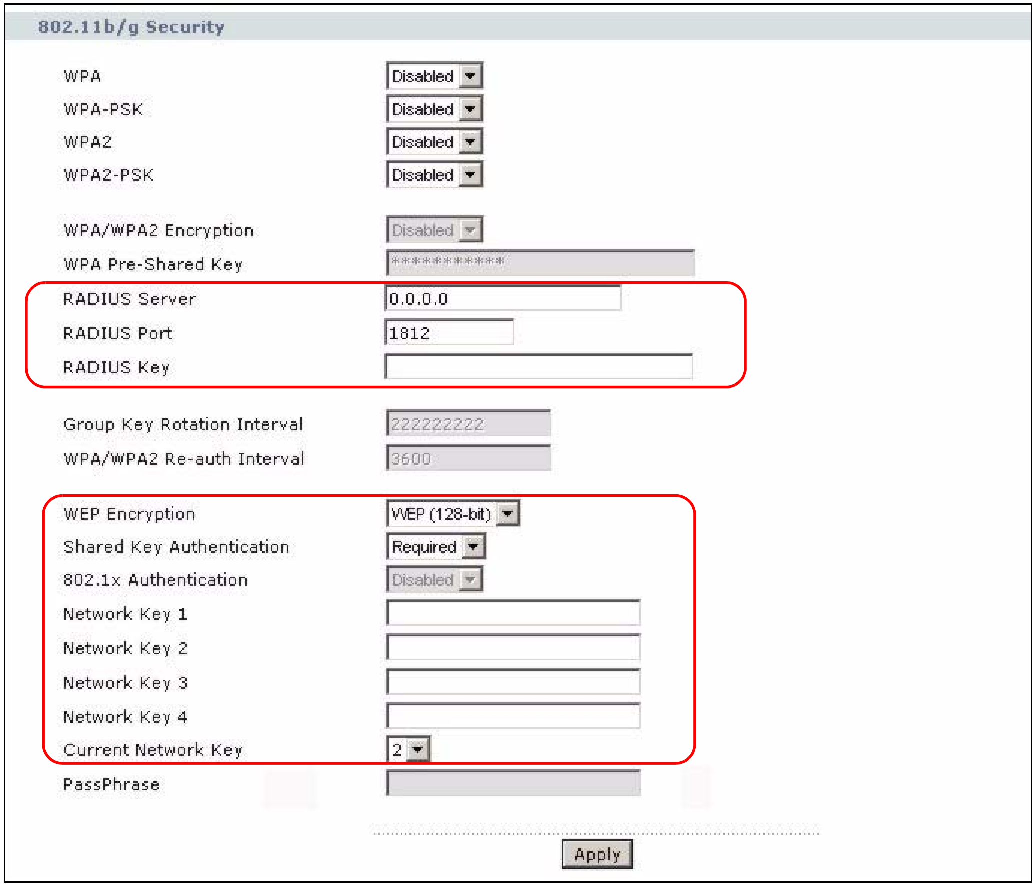
6.3.1 WEP Encryption

WEP encryption scrambles the data transmitted between the wireless stations and the access points to keep network communications private. It encrypts unicast and multicast communications in a network. Both the wireless stations and the access points must use the same WEP key.

Your ZyXEL Device allows you to configure up to four 64-bit or 128-bit WEP keys but only one key can be enabled at any one time.

Click **Wireless > Security** and select **Disable** in the **WPA**, **WPA-PSK**, **WPA2** and **WPA2-PSK** fields to display the configuration screen.

Figure 17 Wireless: Security: WEP



802.11b/g Security

WPA	Disabled
WPA-PSK	Disabled
WPA2	Disabled
WPA2-PSK	Disabled
WPA/WPA2 Encryption	Disabled
WPA Pre-Shared Key	***********
RADIUS Server	0.0.0.0
RADIUS Port	1812
RADIUS Key	
Group Key Rotation Interval	222222222
WPA/WPA2 Re-auth Interval	3600
WEP Encryption	WEP (128-bit)
Shared Key Authentication	Required
802.1x Authentication	Disabled
Network Key 1	
Network Key 2	
Network Key 3	
Network Key 4	
Current Network Key	2
PassPhrase	

The following table describes the WEP encryption related labels in this screen.

Table 18 Wireless: Security: WEP Encryption

LABEL	DESCRIPTION
RADIUS Server	Enter the IP address of the external authentication server in dotted decimal notation. You only need to configure RADIUS server settings if you enable 802.1x authentication.
RADIUS Port	The default port of the RADIUS server for authentication is **1812**. You need not change this value unless your network administrator instructs you to do so with additional information. You only need to configure RADIUS server settings if you enable 802.1x authentication.
RADIUS Key	Enter a password (up to 31 alphanumeric characters) as the key to be shared between the external authentication server and the access points. The key is not sent over the network. This key must be the same on the external authentication server and ZyXEL Device. You only need to configure RADIUS server settings if you enable 802.1x authentication.

Table 18 Wireless: Security: WEP Encryption (continued)

LABEL	DESCRIPTION
WEP Encryption	WEP (Wired Equivalent Privacy) encrypts data frames before transmitting over the wireless network. Select **Disable** to allow all wireless stations to communicate with the access points without any data encryption. Select **WEP (64-bit)** or **WEP (128-bit)** to use data encryption.
Shared Key Authentication	Select **Required** to use the selected WEP key for basic wireless authentication. Select **Disabled** to set the ZyXEL Device not to perform basic wireless authentication with a WEP key. Note: You can only configure 802.1x Authentication settings if Shared Key Authentication is set to Disabled.
802.1x Authentication	You must have a RADIUS server when you select this setting. You must also configure the **RADIUS Key** field in this screen. The RADIUS server must be set up with the same **RADIUS Key** as the ZyXEL Device. Wireless clients authenticate with the RADIUS server before they can access your wireless network.
Network Key 1.. 4	The WEP keys are used to encrypt data. Both the ZyXEL Device and the wireless stations must use the same WEP key for data transmission. If you want to manually set the WEP keys, enter the key in the field provided. If you chose **64-bit WEP**, then enter any 5 ASCII characters or 10 hexadecimal characters ("0-9", "A-F"). If you chose **128-bit WEP**, then enter 13 ASCII characters or 26 hexadecimal characters ("0-9", "A-F"). The values for the WEP keys must be set up exactly the same on all wireless devices in the same wireless LAN. You can configure all four keys, but only one key can be used at any one time. The default key is **Network Key 1**.
Current Network Key	Select a key to use for data encryption.
Apply	Click **Apply** to save your changes back to the ZyXEL Device.

6.3.2 Introduction to WPA(2)

Wi-Fi Protected Access (WPA) is a subset of the IEEE 802.11i standard. Key differences between WPA(2) and WEP are user authentication and improved data encryption.

6.3.2.1 User Authentication

WPA(2) applies IEEE 802.1x and Extensible Authentication Protocol (EAP) to authenticate wireless clients using an external RADIUS database.

Therefore, if you don't have an external RADIUS server you should use WPA(2)-PSK (WPA -Pre-Shared Key) that only requires a single (identical) password entered into each access point, wireless gateway and wireless client. As long as the passwords match, a client will be granted access to a WLAN.

6.3.2.2 Encryption

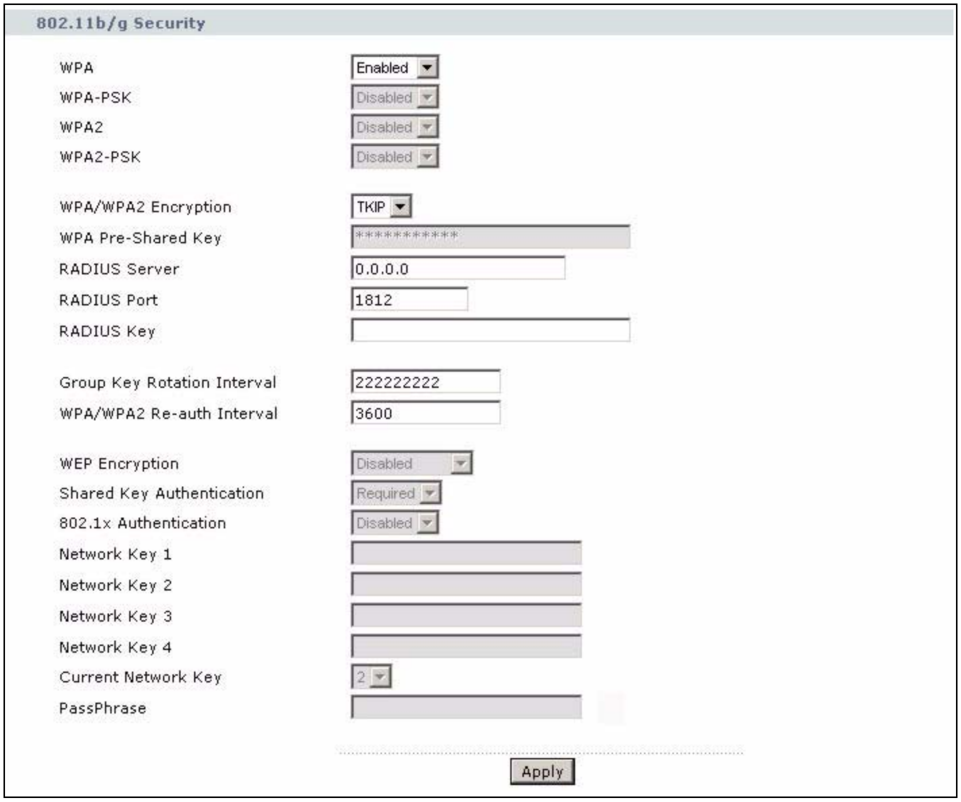
WPA improves data encryption by using Temporal Key Integrity Protocol (TKIP), Message Integrity Check (MIC) and IEEE 802.1x. WPA2 uses Advanced Encryption Standard (AES) to offer stronger encryption.

- Use WPA security if you have WPA-aware wireless clients and a RADIUS server. WPA has user authentication and improved data encryption over WEP.
- Use WPA-PSK if you have WPA-aware wireless clients but no RADIUS server.
- If you don’t have WPA-aware wireless clients, then use WEP key encrypting. A higher bit key offers better security at a throughput trade-off. You can use Passphrase to automatically generate 64-bit or 128-bit WEP keys or manually enter 64-bit or 128-bit WEP keys.

6.3.3 WPA/WPA2

Click **Wireless > Security** and select **Enabled** in only the **WPA** or **WPA2** field to display the configuration screen.

Figure 18 Wireless: Security: WPA



802.11b/g Security

WPA	Enabled
WPA-PSK	Disabled
WPA2	Disabled
WPA2-PSK	Disabled
WPA/WPA2 Encryption	TKIP
WPA Pre-Shared Key	***********
RADIUS Server	0.0.0.0
RADIUS Port	1812
RADIUS Key	
Group Key Rotation Interval	222222222
WPA/WPA2 Re-auth Interval	3600
WEP Encryption	Disabled
Shared Key Authentication	Required
802.1x Authentication	Disabled
Network Key 1	
Network Key 2	
Network Key 3	
Network Key 4	
Current Network Key	2
PassPhrase	

The follow table describes the WPA related labels in this screen.

Table 19 Wireless: Security: WPA/WPA2

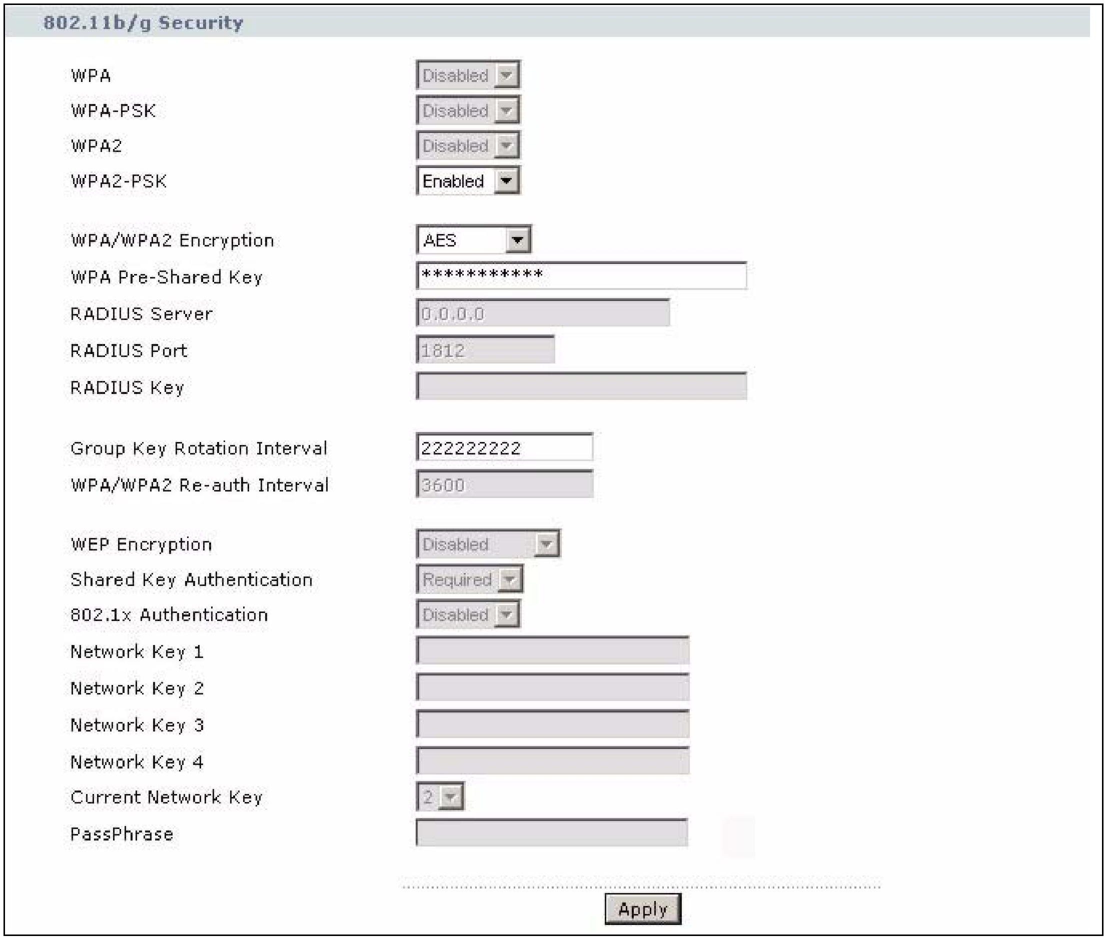
LABEL	DESCRIPTION
WPA/WPA2 Encryption	Select an encryption type.
RADIUS Server	Enter the IP address of the external authentication server in dotted decimal notation.
RADIUS Port	The default port of the RADIUS server for authentication is **1812**. You need not change this value unless your network administrator instructs you to do so with additional information.
RADIUS Key	Enter a password (up to 31 alphanumeric characters) as the key to be shared between the external authentication server and the access points. The key is not sent over the network. This key must be the same on the external authentication server and ZyXEL Device.
Apply	Click **Apply** to save your changes back to the ZyXEL Device.

6.3.4 WPA-PSK/WPA2-PSK

If you don’t have an external RADIUS server, you should use WPA(2)-PSK (WPA - Pre-Shared Key). WPA(2)-PSK only requires a single (identical) password entered into each WLAN member. As long as the passwords match, a client will be granted access to the wireless network.

Click **Wireless > Security** and select **Enabled** in the **WPA-PSK** or **WPA2-PSK** field to display the configuration screen as shown.

Figure 19 Wireless: Security: WPA-PSK



802.11b/g Security

WPA: Disabled
WPA-PSK: Disabled
WPA2: Disabled
WPA2-PSK: Enabled

WPA/WPA2 Encryption: AES
WPA Pre-Shared Key: ***********
RADIUS Server: 0.0.0.0
RADIUS Port: 1812
RADIUS Key:

Group Key Rotation Interval: 222222222
WPA/WPA2 Re-auth Interval: 3600

WEP Encryption: Disabled
Shared Key Authentication: Required
802.1x Authentication: Disabled
Network Key 1:
Network Key 2:
Network Key 3:
Network Key 4:
Current Network Key: 2
PassPhrase:

The follow table describes the WPA related labels in this screen.

Table 20 Wireless: Security: WPA-PSK

LABEL	DESCRIPTION
WPA-PSK	Select Enabled to activate WPA-PSK wireless LAN security.
WPA/WPA2 Encryption	Select an encryption type.

Table 20 Wireless: Security: WPA-PSK (continued)

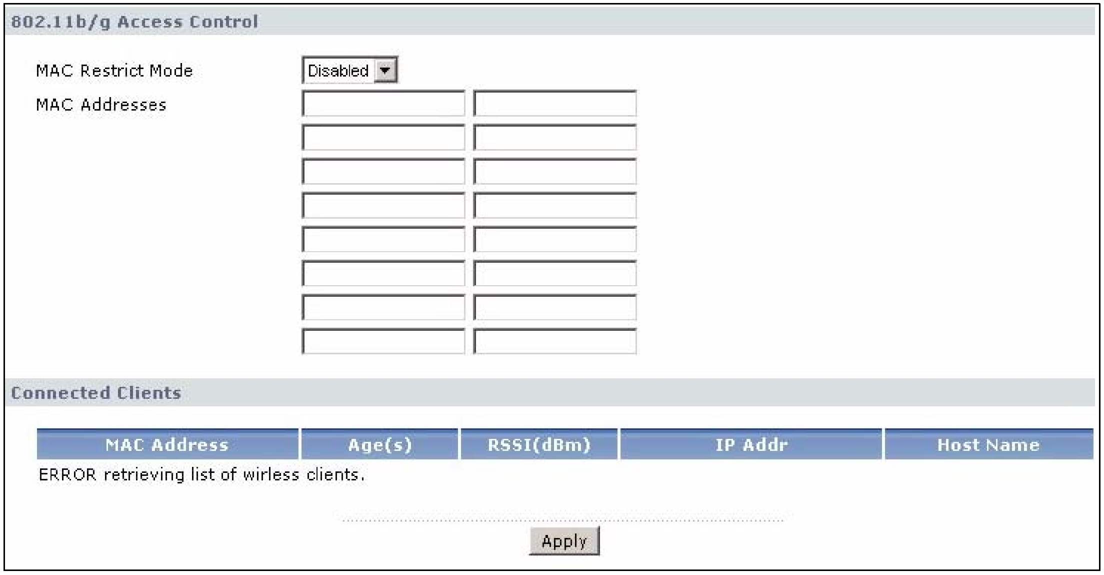
LABEL	DESCRIPTION
WPA Pre-Shared Key	Enter a password (up to 31 alphanumeric characters) as the key to be shared between the external authentication server and the access points. The key is not sent over the network. This key must be the same on the external authentication server and ZyXEL Device.
Group Key Rotation Interval	This is the rate at which the AP sends a new group key out to all clients. The re-keying process is the WPA equivalent of automatically changing the WEP key for an AP and all stations in a WLAN on a periodic basis. Enter the number of seconds between a key rotation occurs.
Apply	Click **Apply** to save your changes back to the ZyXEL Device.

6.4 Access Control

To change your ZyXEL Device Access Control settings click **Wireless > Access Control**.

Note: Be careful not to list your computer's MAC address and set the **MAC Restrict Mode** field to **Deny** when managing the ZyXEL Device via a wireless connection. This would lock you out.

Figure 20 Wireless: Access Control



802.11b/g Access Control

MAC Restrict Mode: Disabled

MAC Addresses

Connected Clients

MAC Address	Age(s)	RSSI(dBm)	IP Addr	Host Name

ERROR retrieving list of wirless clients.

The following table describes the labels in this screen.

Table 21 Wireless: Access Control

LABEL	DESCRIPTION
802.11b/g Access Control	
MAC Restrict Mode	Enable/disable wireless access control and/or set action for the list of MAC addresses in the **MAC Address** table. Select **Deny** to block access to the router, MAC addresses not listed will be allowed to access the ZyXEL Device. Select **Allow** to permit access to the router, MAC addresses not listed will be denied access to the ZyXEL Device. Select **Disabled** to deactivate this feature.
MAC Address	Enter the MAC addresses in a valid MAC address format, that is, six hexadecimal character pairs, for example, 12:34:56:78:9a:bc of the wireless stations that are allowed or denied access to the ZyXEL Device in these address fields.
Apply	Click **Apply** to save the settings.
Connected Clients	The table below displays the list of wireless LAN client(s) that is currently connect to the ZyXEL Device.
MAC Address	This field displays the MAC (Media Access Control) address of an associated wireless station. Every Ethernet device has a unique MAC address. The MAC address is assigned at the factory and consists of six pairs of hexadecimal characters, for example, 00:A0:C5:00:00:02.
Age(s)	This field displays the time (in seconds) since the wireless device connected to the ZyXEL Device.
RSSI (dBm)	Received Signal Strength Indicator (RSSI) measures the strength of the signals received. When the received signal strength is below the specified RSSI value, the wireless device sends a clear-to-send (CTS) signal. This field displays the RSSI value for a wireless device.
IP Addr	This field displays the IP address associated to the MAC address above.
Host Name	This is the name of the host computer.

7

Maintenance

7.1 Overview

This chapter shows you how to change the ZyXEL Device administrator login password and perform device connection tests.

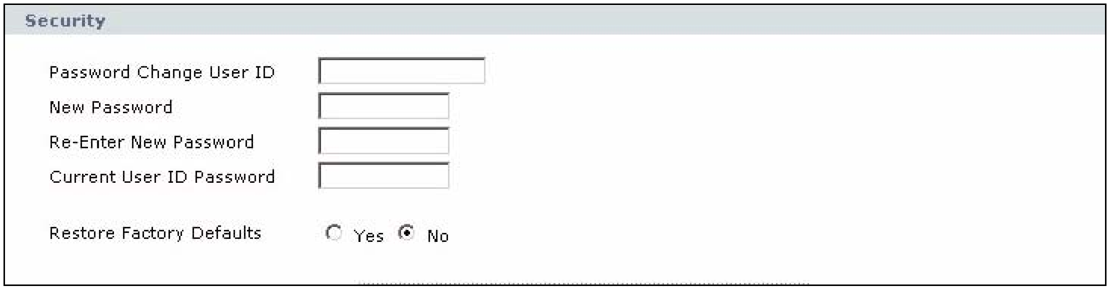
7.1.1 What You Can Do in this Chapter

- The **Security** screen allows you to change the password used for accessing the ZyXEL Device (Section 7.2 on page 63).
- The **Diagnostics** screen allows you to ping a device to test the connection or to perform a trace route (Section 7.3 on page 64).
- The **Band** screen allow you to configure frequency bands for faster downstream channel scanning for Internet access (Section 7.4 on page 66).

7.2 Security

It is highly recommended that you periodically change the password for accessing the ZyXEL Device. If you didn't change the default one after you logged in or you want to change to a new password again, then click **Maintenance > Security** to display the screen as shown next.

Figure 21 Maintenance: Security



Security

Password Change User ID	
New Password	
Re-Enter New Password	
Current User ID Password	
Restore Factory Defaults	○ Yes ● No

The following table describes the labels in this screen.

Table 22 Maintenance: Security

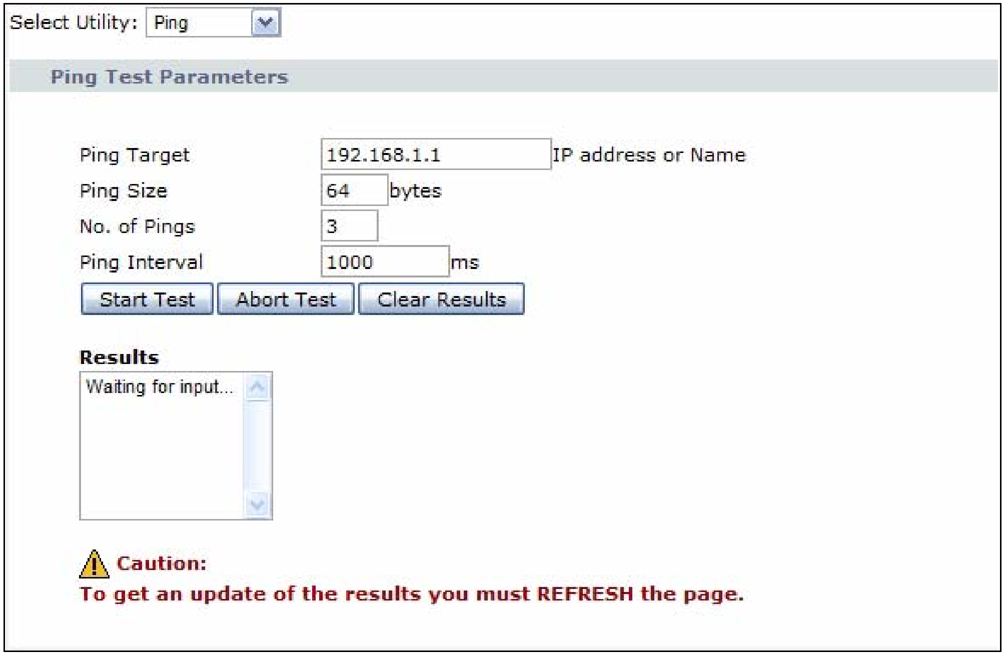
LABEL	DESCRIPTION
Password Change User ID	Enter the login username whose password you want to change.
New Password	Type the new password in this field. Passwords may be up to 16 characters in length and must be alphanumeric (a-z, A-Z, 0-9), no other characters are allowed.
Re-enter New Password	Type the new password again in this field.
Current User ID Password	Type the default password or the existing password (associated with the username you enter above) you use to access the system in this field.
Restore to Factory Defaults	Select **Yes** to restore the ZyXEL Device settings to the factory defaults. Otherwise, select **No** to keep your ZyXEL Device settings.
Apply	Click **Apply** to save your changes.

7.3 Diagnostics

Use the **Diagnostics** screen to ping a device to test the connection or to perform a trace route.

Click **Maintenance > Diagnostic** to display the screen, then select either **Ping** or **Traceroute** from the **Select Utility** menu to choose a test.

Figure 22 Maintenance: Diagnostic (Ping)



Select Utility: Ping

Ping Test Parameters

Ping Target: 192.168.1.1 IP address or Name

Ping Size: 64 bytes

No. of Pings: 3

Ping Interval: 1000 ms

Results

Waiting for input...

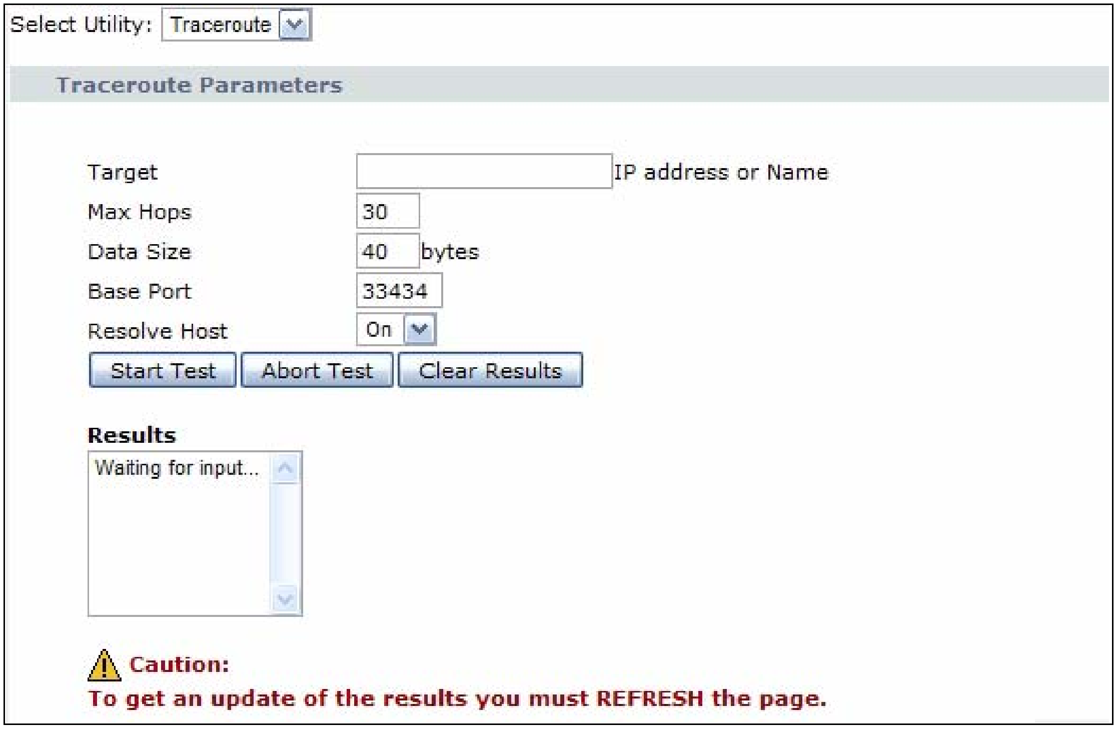
Caution:
To get an update of the results you must REFRESH the page.

The following table describes the labels in this screen.

Table 23 Maintenance: Diagnostics (Ping)

LABEL	DESCRIPTION
Select Utility	Select either **Ping** or **Traceroute** from the **Select Utility** menu to choose a test. The screen changes accordingly.
Ping Test Parameters	
Ping Target	Type the IP address or domain name (such as www.example.com) of a device that you want to ping in order to test a connection.
Ping Size	Specify the size of the ping packet the ZyXEL Device is to send. The default is 64 bytes (56 bytes of data plus 8 bytes for the header). If you need to determine the Maximum Transmission Unit (MTU) size TCP/IP connection, change this setting. Otherwise leave it as the default.
No. of Pings	Specify the number of ping packets the ZyXEL Device sends to the target device.
Ping Interval	Specify the time (in milliseconds) the ZyXEL Device sends a ping packet.
Start Test	Click **Start Test** to begin the ping test.
Abort Test	Click **Abort Test** to stop the ping test.
Clear Results	Click **Clear Results** to clear the **Results** text box.
Results	This read-only text box displays the ping test results.

Figure 23 Maintenance: Diagnostic (Traceroute)



Select Utility: Traceroute

Traceroute Parameters

Target		IP address or Name
Max Hops	30	
Data Size	40	bytes
Base Port	33434	
Resolve Host	On	

Results

Waiting for input...

Caution:
To get an update of the results you must REFRESH the page.

The following table describes the labels in this screen.

Table 24 Maintenance: Diagnostics (Traceroute)

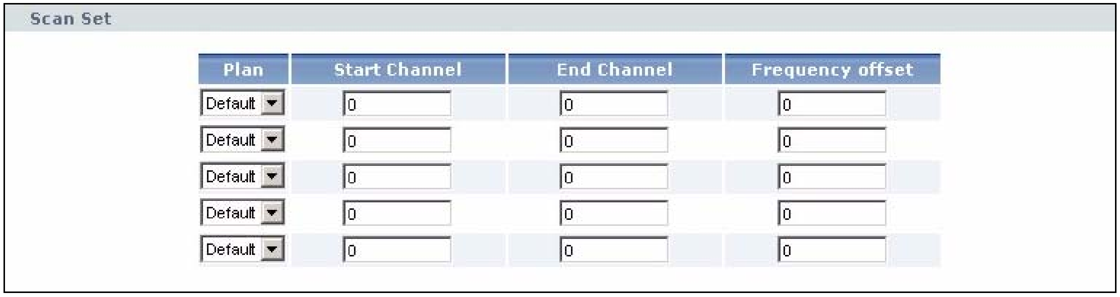
LABEL	DESCRIPTION
Select Utility	Select either **Ping** or **Traceroute** from the **Select Utility** menu to choose a test. The screen changes accordingly.
Traceroute Test Parameters	
Target	Type the IP address or domain name (such as www.example.com) of a device that you want to traceroute in order to test a connection.
Max Hops	Specify the maximum number of hops the traceroute takes before the process ends. A hop is connection from one router or intermediate device to another on a network. The more hops there are, the longer it takes for data to reach its destination.
Data Size	Specify the number of data packet bytes the ZyXEL Device sends on the traceroute. The default is 40 bytes (32 bytes of data plus 8 bytes for the header). If you need to determine the Maximum Transmission Unit (MTU) size TCP/IP connection, change this setting. Otherwise leave it as the default.
Base Port	This field is not enabled as of this writing.
Resolve Host	Select **On** to resolved all IP addresses returned by the traceroute to their domain names.
Start Test	Click **Start Test** to begin the ping test.
Abort Test	Click **Abort Test** to stop the ping test.
Clear Results	Click **Clear Results** to clear the **Results** text box.
Results	This read-only text box displays the ping test results.

7.4 Band

Use the **Band** screen to configure frequency bands for faster downstream channel scanning for Internet access.

Click **Maintenance > Band** to display the configuration screen.

Figure 24 Maintenance: Band



Scan Set

Plan	Start Channel	End Channel	Frequency offset
Default	0	0	0
Default	0	0	0
Default	0	0	0
Default	0	0	0
Default	0	0	0

The following table describes the labels in this screen.

Table 25 Maintenance: Band

LABEL	DESCRIPTION
Plan	Select a pre-defined band plan setting you wish to configure. The band plans are: • **EIA**: EIA-542 Cable Television Channel Identification Plan • **HRC**: Harmonic -Related Carrier Frequency Plan • **BG**: Europe Standard B + G Frequency Plan • **OIRT**: OIRT Standard D Frequency Plan • **EURO**: 250 kHz incremental Non-Standard Frequency Plan
Start Channel	Select scan plan **EIA**, **HRC**, **OIRT** or **BG** and enter the first channel ID in the range you want the ZyXEL Device to scan. For the **EURO** plan enter the starting frequency (lowest) you want the ZyXEL Device to scan.
End Channel	Select scan plan **EIA**, **HRC**, **OIRT** or **BG** and enter the last channel ID in the range you want the ZyXEL Device to scan. For the **EURO** plan enter the last frequency (highest) you want the ZyXEL Device to scan.
Frequency Offset	This field is applicable when you select **EURO** in the **Plan** field. Enter the offset. For example if you enter 50000, the ZyXEL Device will scan frequencies from the starting frequency to the last frequency in 50000 Hz increments.
Apply	Click **Apply** to save the settings.

PART II
Appendices and Index

A

Product Specifications

See also the Introduction chapter for a general overview of the key features.

Firmware Features

Table 26 Firmware Features

FEATURE	DESCRIPTION
High Speed Internet Access	The ZyXEL Device supports transmission speeds of up to 43 Mbps upstream and 30 Mbps downstream. Actual speeds attained depend on your cable operator's CMTS (Cable Modem Termination System). Note: The standard your cable operator supports determines the maximum upstream and downstream speeds attainable. Actual speeds attained depend on the distance from the cable operator's central office, noise, and so on.
Network Address Translation (NAT)	Each computer on your network must have its own unique IP address. Use NAT to convert your public IP address(es) to multiple private IP addresses for the computers on your network.
Port Forwarding	If you have a server (mail or web server for example) on your network, you can use this feature to let people access it from the Internet.
DHCP (Dynamic Host Configuration Protocol)	Use this feature to have the ZyXEL Device assign IP addresses, an IP default gateway and DNS servers to computers on your network.
Management	Use the built in web configurator to configure and diagnose your ZyXEL Device.
IP Multicast	IP multicast is used to send traffic to a specific group of computers. The ZyXEL Device supports version 1 IGMP (Internet Group Management Protocol) used to join multicast groups (see RFC 2236).
Wireless Functionality (P-974HW Only)	Allow the IEEE 802.11b and/or IEEE 802.11g wireless clients to connect to the ZyXEL Device wirelessly. Enable wireless security (WEP, WPA(2), WPA(2)-PSK) and/or MAC filtering to protect your wireless network.

IEEE 802.11b/g data rate and modulation are as follows:

Table 27 IEEE802.11b/g

DATA RATE (MBPS)	MODULATION
1	DBPSK (Differential Binary Phase Shift Keyed)
2	DQPSK (Differential Quadrature Phase Shift Keying)
5.5 / 11	CCK (Complementary Code Keying)
6/9/12/18/24/36/48/54	OFDM (Orthogonal Frequency Division Multiplexing)

Device Specification

Table 28 Device Specifications

NETWORK	
Default IP Address	192.168.1.1:8080
Default Subnet Mask	255.255.255.0 (24 bits)
Default Administrator Username	webadmin
Default Administrator Password	1234
DHCP	Relay - Supports up to five (5) IP addresses from a remote DHCP server. Server - Configurable IP address pool and limits on number of DHCP clients.
Cable Modem Standard	DOCSIS 2.0 Compliant Cable Home 1.1 Compliant
Ethernet Ports	Four auto-negotiating, auto MDI/MDI-X 10/100 Mbps RJ-45 Ethernet ports.
USB Port	One USB 2.0 port for connecting to the P-974H/HW.
Management	SNMP v1, v2, and v3. Remote status monitoring Web Configurator FTP Text based configuration file for easy deployment TACACS+ server support

Table 28 Device Specifications (continued)

Wireless (P-974HW Only)	WEP, WPA, WPA2, WPA-PSK, WPA2-PSK RADIUS server authentication MAC Filter IEEE 802.1x authentication Bridging Mode
External Antenna	Detachable 3dBi antenna
SECURITY	
Type supported	BPI and BPI+.
Packet filter	DOCSIS packet filter.
Alerts and Logs	Logging: gateway activities, hacking attempts Alerts: Email alerts based on filtering
PHYSICAL	
Dimensions	(197 W) x (143 D) x (31 H) mm
Operation Temperature	0º C ~ 40º C
Storage Temperature	-30º ~ 60º C
Operation Humidity	20% ~ 90% RH
Storage Humidity	10% ~ 90% RH
DOWNSTREAM CHANNEL	
Center Frequency	91 to 857 MHZ
Channel Bandwidth	6 Mhz
Input Impedance	75 ohms (nominal)
Modulation	64 QAM or 256 QAM
Maximum Data rate	30 Mbps for 64 QAM 43Mbps for 256 QAM
Symbol Rates	5.057 Msym/s for 64 QAM 5.361 Msym/s for 256 QAM
Operating Level	-15 to +15 dBmV
UPSTREAM CHANNEL	
Frequency Range	5 to 42 Mhz
Bandwidth	200 Khz/400 Khz/800 Khz 1.6 Mhz/3.2 Mhz/6.4* Mhz
Output Impedance	75 ohms (nominal)
Modulation	8*/16/32*/64*/128* QAM or QPSK

Table 28 Device Specifications (continued)

Maximum Data Rate	30 Mbps
Symbol Rates	160, 320, 640, 1280, 2560 and 5120* Ksym/s
Operating Level	TDMA: +8 to +54 dBmV (32 QAM, 64QAM) +8 to +55 dBmV (8 QAM, 16QAM) +8 to +58 dBmV (QPSK) S-CDMA: +8 to +53 dBmV (all modulation types)
OPERATING SYSTEM COMPATIBILITY	
Ethernet Connection	Windows 95/98se/2000/ ME/XP, Macintosh, Linux and UNIX
USB Connection	Window 98sec/2000/ME/XP

Power Adaptor Specifications

Table 29 P-974H/HW Power Adaptor Specifications

NORTH AMERICAN PLUG STANDARDS	
AC Power Adapter Model	MU18-2120150-A1
Input Power	100~240 Volts AC, 50-60 Hz, 0.6A
Output Power	12 Volts DC, 1.5A 18W
Power Consumption	12W Max
Safety Standards	UL 60950-1 First Edition CSA C22.2 No. 60950-1-03 First Edition
EUROPEAN PLUG STANDARDS	
AC Power Adapter Model	MU18-2120150-C5
Input Power	100~240 Volts AC, 50-60 Hz, 0.6A
Output Power	12 Volts DC, 1.5A 18W
Power Consumption	12W Max
Safety Standards	EN/IEC 60950-1:2001
UNITED KINGDOM PLUG STANDARDS	
AC Power Adapter Model	MU18-2120150-B2
Input Power	100~240 Volts AC, 50-60 Hz, 0.6A
Output Power	12 Volts DC, 1.5A 18W

Table 29 P-974H/HW Power Adaptor Specifications (continued)

Power Consumption	12W Max
Safety Standards	EN/IEC 60950-1:2001
AUSTRALIA PLUG STANDARDS	
AC Power Adapter Model	MU18-2120150-A3
Input Power	100~240 Volts AC, 50-60 Hz, 0.6A
Output Power	12 Volts DC, 1.5A 18W
Power Consumption	12W Max
Safety Standards	EN 60950:2000 IEC 60950-1:2001

B

Sample Configurations

7.5 Overview

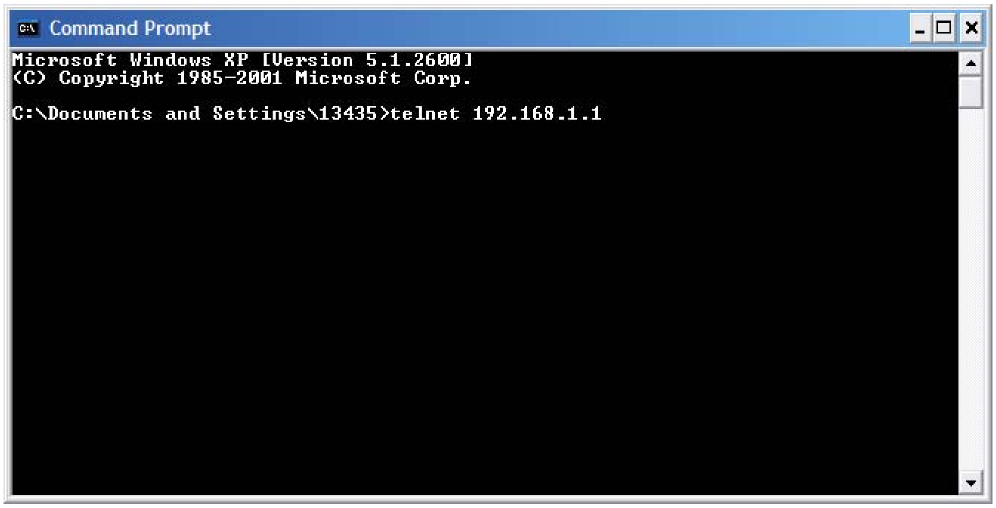
The following are some sample configurations for your ZyXEL Device. The values used in these samples are for example purposes only; please use the values provided by your ISP where appropriate.

7.6 Connecting to the ZyXEL Device with Telnet

Before you can use these sample configurations, you must first connect to the ZyXEL Device with Telnet.

1 Open your Command Line prompt or terminal application.

2 Telnet to 198.162.1.1.



```
Microsoft Windows XP [Version 5.1.2600]
(C) Copyright 1985-2001 Microsoft Corp.

C:\Documents and Settings\13435>telnet 192.168.1.1
```

3 Login as admin (default password “1234”).

After connecting to the ZyXEL Device, you can enter any of the commands in the following samples. Be sure to customize them first.

7.6.1 Set Static IP Only

To set only a static IP address, enter the following commands:

```
 > defaults
 > ip_sharing false
 > dhcp_enable false
 > dhcp_server 10.13.17.1 255.255.255.0
 > static_ip 10.13.17.1 255.255.255.0
 > dns_server 172.21.3.88 172.23.5.1 172.23.5.2
 > rip_enable true
 > rip2_md5 true
 > rip2_keyid 1
 > rip2_keystr david
 > save
 > reset
```

Change the settings according to the information provided by your ISP or network administrator.

7.6.2 Set Static IP with Public DHCP

To set a static IP address with a public DHCP server, enter the following commands:

```
> defaults
> ip_sharing false
> dhcp_enable true
> dhcp_server 10.13.17.1 255.255.255.0
> dhcp_pool 10.13.17.2 20
> static_ip 10.13.17.1 255.255.255.0
> dns_server 172.21.3.88 172.23.5.1 172.23.5.2
> rip_enable true
> rip2_md5 true
> rip2_keyid 1
> rip2_keystr david
> save
> reset
```

Change the settings according to the information provided by your ISP or network administrator.

7.6.3 Set Static IP with NAT

To set a static IP address with NAT, enter the following commands:

```
> defaults
> ip_sharing false
> dhcp_enable false
> dhcp_server 192.168.1.1 255.255.255.0
> static_ip 10.13.17.1 255.255.255.0
> dns_server 172.21.3.88 172.23.5.1 172.23.5.2
> rip_enable true
> rip2_md5 true
> rip2_keyid 1
> rip2_keystr david
> save
> reset
```

Change the settings according to the information provided by your ISP or network administrator.

7.6.4 Set Static IP with NAT and Private DHCP

To set a static IP address with NAT and a private DHCP server, enter the following commands:

```
> defaults
> ip_sharing false
> dhcp_enable true
> dhcp_server 192.168.1.1 255.255.255.0
> dhcp_pool 192.168.1.2 20
> static_ip 10.13.17.1 255.255.255.0
> dns_server 172.21.3.88 172.23.5.1 172.23.5.2
> rip_enable true
> rip2_md5 true
> rip2_keyid 1
> rip2_keystr david
> save
> reset
```

Change the settings according to the information provided by your ISP or network administrator.

7.6.5 Set Bridge Mode

To set the ZyXEL Device to bridge mode, enter the following commands:

```
> defaults
> router_enable false
> save
> reset
```

7.6.6 Set Default IP Sharing / RG Mode

To set the ZyXEL Device to its default IP Sharing / RG mode, enter the following commands:

```
> defaults
> save
> reset
```

Change the settings according to the information provided by your ISP or network administrator.

C

Setting up Your Computer’s IP Address

All computers must have a 10M or 100M Ethernet adapter card and TCP/IP installed.

Windows 95/98/Me/NT/2000/XP, Macintosh OS 7 and later operating systems and all versions of UNIX/LINUX include the software components you need to install and use TCP/IP on your computer. Windows 3.1 requires the purchase of a third-party TCP/IP application package.

TCP/IP should already be installed on computers using Windows NT/2000/XP, Macintosh OS 7 and later operating systems.

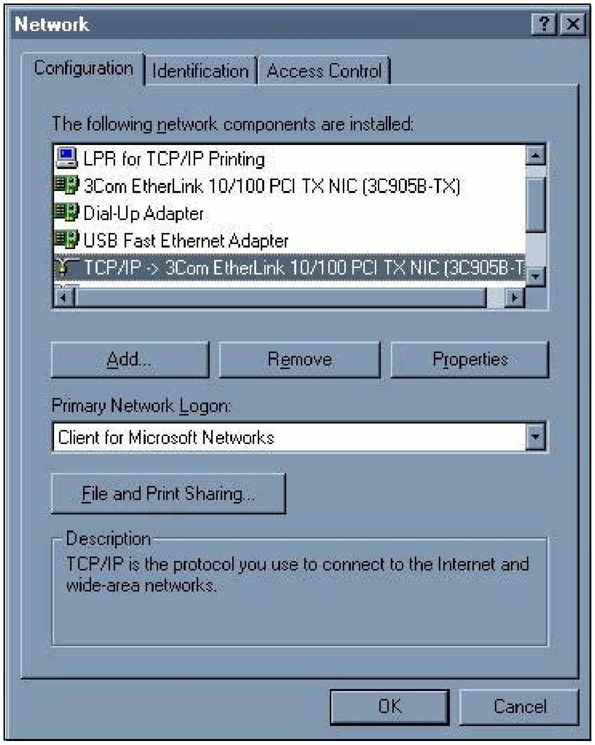
After the appropriate TCP/IP components are installed, configure the TCP/IP settings in order to "communicate" with your network.

If you manually assign IP information instead of using dynamic assignment, make sure that your computers have IP addresses that place them in the same subnet as the ZyXEL Device’s LAN port.

Windows 95/98/Me

Click **Start**, **Settings**, **Control Panel** and double-click the **Network** icon to open the **Network** window.

Figure 25 WIndows 95/98/Me: Network: Configuration



Network
?
X
Configuration
Identification
Access Control
The following network components are installed:
LPR for TCP/IP Printing
3Com EtherLink 10/100 PCI TX NIC (3C905B-TX)
Dial-Up Adapter
USB Fast Ethernet Adapter
TCP/IP -> 3Com EtherLink 10/100 PCI TX NIC (3C905B-T
Add...
Remove
Properties
Primary Network Logon:
Client for Microsoft Networks
File and Print Sharing...
Description
TCP/IP is the protocol you use to connect to the Internet and wide-area networks.
OK
Cancel

Installing Components

The **Network** window **Configuration** tab displays a list of installed components. You need a network adapter, the TCP/IP protocol and Client for Microsoft Networks.

If you need the adapter:

1 In the **Network** window, click **Add**.

2 Select **Adapter** and then click **Add**.

3 Select the manufacturer and model of your network adapter and then click **OK**.

If you need TCP/IP:

1 In the **Network** window, click **Add**.

2 Select **Protocol** and then click **Add**.

3 Select **Microsoft** from the list of **manufacturers**.

4 Select **TCP/IP** from the list of network protocols and then click **OK**.

If you need Client for Microsoft Networks:

1 Click **Add**.

2 Select **Client** and then click **Add**.

3 Select **Microsoft** from the list of manufacturers.

4 Select **Client for Microsoft Networks** from the list of network clients and then click **OK**.

5 Restart your computer so the changes you made take effect.

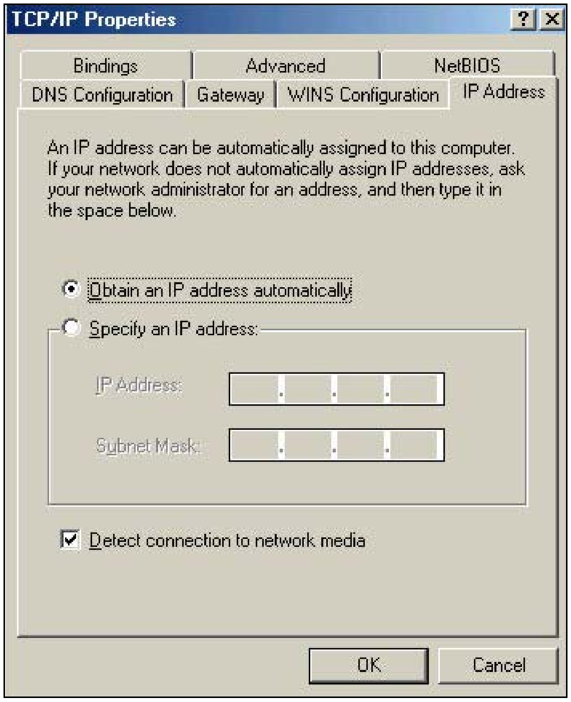
Configuring

1 In the **Network** window **Configuration** tab, select your network adapter's TCP/IP entry and click **Properties**

2 Click the **IP Address** tab.

- If your IP address is dynamic, select **Obtain an IP address automatically**.
- If you have a static IP address, select **Specify an IP address** and type your information into the **IP Address** and **Subnet Mask** fields.

Figure 26 Windows 95/98/Me: TCP/IP Properties: IP Address



An IP address can be automatically assigned to this computer. If your network does not automatically assign IP addresses, ask your network administrator for an address, and then type it in the space below.

● Obtain an IP address automatically

○ Specify an IP address:

IP Address: . . .

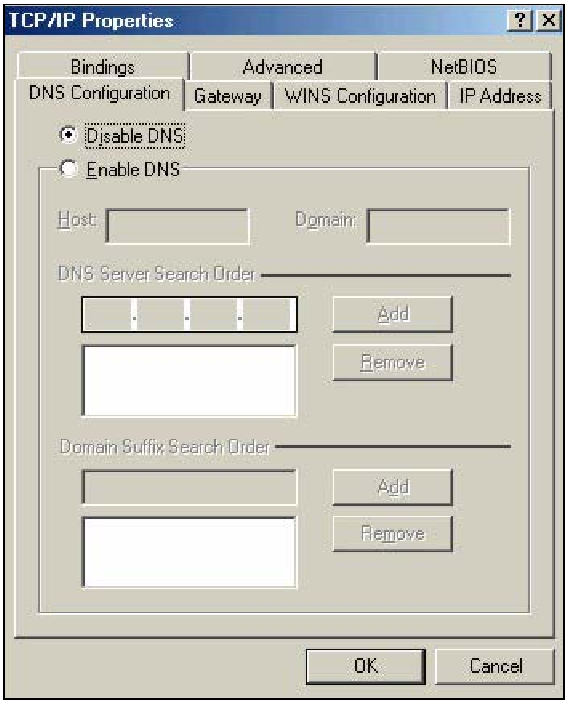
Subnet Mask: . . .

☑ Detect connection to network media

3 Click the **DNS** Configuration tab.

- If you do not know your DNS information, select **Disable DNS**.
- If you know your DNS information, select **Enable DNS** and type the information in the fields below (you may not need to fill them all in).

Figure 27 Windows 95/98/Me: TCP/IP Properties: DNS Configuration



● Disable DNS

○ Enable DNS

4 Click the **Gateway** tab.

- If you do not know your gateway’s IP address, remove previously installed gateways.
- If you have a gateway IP address, type it in the **New gateway field** and click **Add**.

5 Click **OK** to save and close the **TCP/IP Properties** window.

6 Click **OK** to close the **Network** window. Insert the Windows CD if prompted.

7 Turn on your ZyXEL Device and restart your computer when prompted.

Verifying Settings

1 Click **Start** and then **Run**.

2 In the **Run** window, type "winipcfg" and then click **OK** to open the **IP Configuration** window.

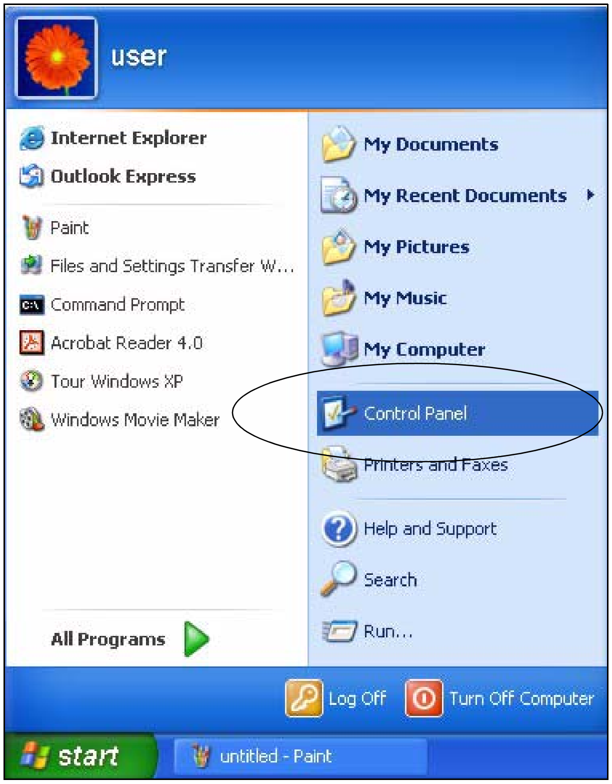
3 Select your network adapter. You should see your computer's IP address, subnet mask and default gateway.

Windows 2000/NT/XP

The following example figures use the default Windows XP GUI theme.

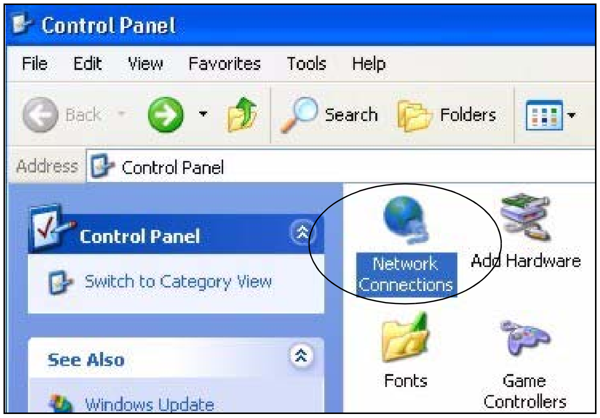
1 Click **start** (**Start** in Windows 2000/NT), **Settings**, **Control Panel**.

Figure 28 Windows XP: Start Menu



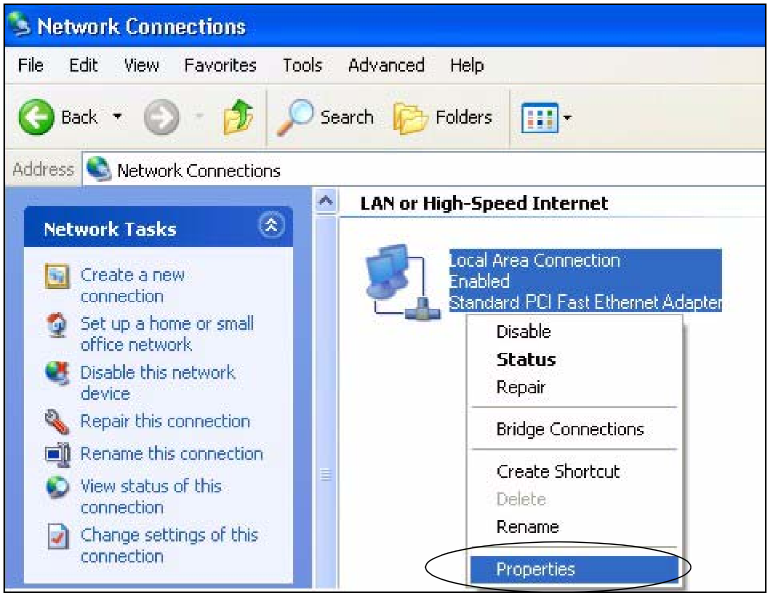
2 In the **Control Panel**, double-click **Network Connections** (**Network and Dial-up Connections** in Windows 2000/NT).

Figure 29 Windows XP: Control Panel



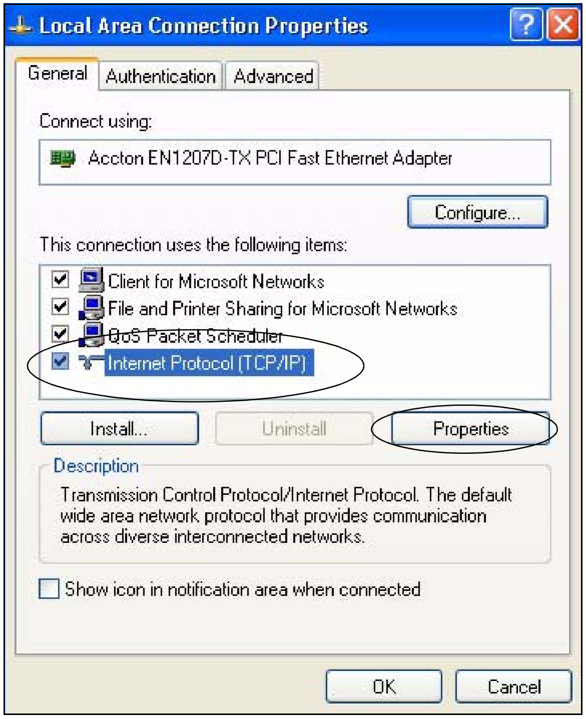
3 Right-click **Local Area Connection** and then click **Properties**.

Figure 30 Windows XP: Control Panel: Network Connections: Properties



4 Select **Internet Protocol (TCP/IP)** (under the **General** tab in Win XP) and then click **Properties**.

Figure 31 Windows XP: Local Area Connection Properties



Connect using:

Accton EN1207D-TX PCI Fast Ethernet Adapter

This connection uses the following items:

☑ Client for Microsoft Networks
☑ File and Printer Sharing for Microsoft Networks
☑ QoS Packet Scheduler
☑ Internet Protocol (TCP/IP)

Description

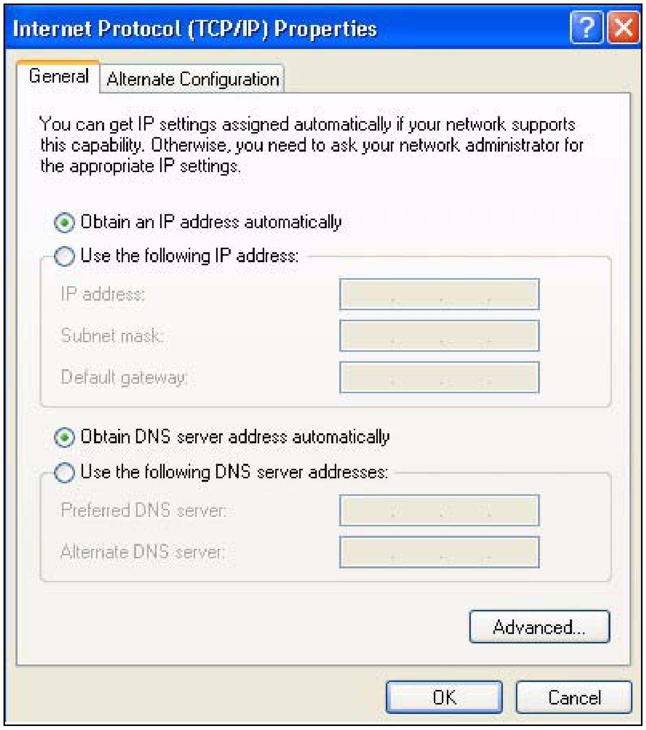
Transmission Control Protocol/Internet Protocol. The default wide area network protocol that provides communication across diverse interconnected networks.

☐ Show icon in notification area when connected

5 The **Internet Protocol TCP/IP Properties** window opens (the **General tab** in Windows XP).

- If you have a dynamic IP address click **Obtain an IP address automatically**.
- If you have a static IP address click **Use the following IP Address** and fill in the **IP address**, **Subnet mask**, and **Default gateway** fields.
- Click **Advanced**.

Figure 32 Windows XP: Internet Protocol (TCP/IP) Properties



Internet Protocol (TCP/IP) Properties

You can get IP settings assigned automatically if your network supports this capability. Otherwise, you need to ask your network administrator for the appropriate IP settings.

● Obtain an IP address automatically

○ Use the following IP address:

● Obtain DNS server address automatically

○ Use the following DNS server addresses:

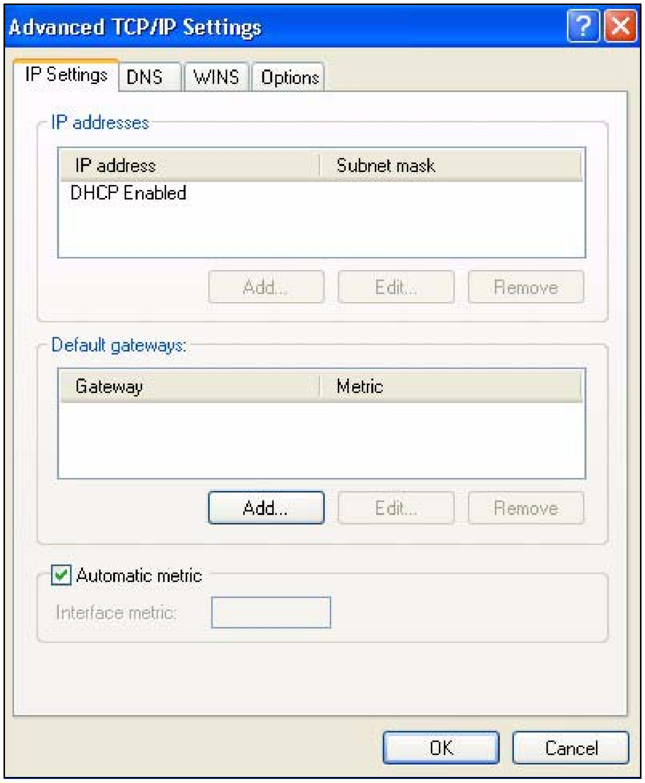
6 If you do not know your gateway's IP address, remove any previously installed gateways in the **IP Settings** tab and click **OK**.

Do one or more of the following if you want to configure additional IP addresses:

- In the **IP Settings** tab, in IP addresses, click **Add**.
- In **TCP/IP Address**, type an IP address in **IP address** and a subnet mask in **Subnet mask**, and then click **Add**.
- Repeat the above two steps for each IP address you want to add.
- Configure additional default gateways in the **IP Settings** tab by clicking **Add** in **Default gateways**.
- In **TCP/IP Gateway Address**, type the IP address of the default gateway in **Gateway**. To manually configure a default metric (the number of transmission hops), clear the **Automatic metric** check box and type a metric in **Metric**.
- Click **Add**.
- Repeat the previous three steps for each default gateway you want to add.

- Click **OK** when finished.

Figure 33 Windows XP: Advanced TCP/IP Properties



IP address	Subnet mask
DHCP Enabled	

Gateway	Metric

☑ Automatic metric

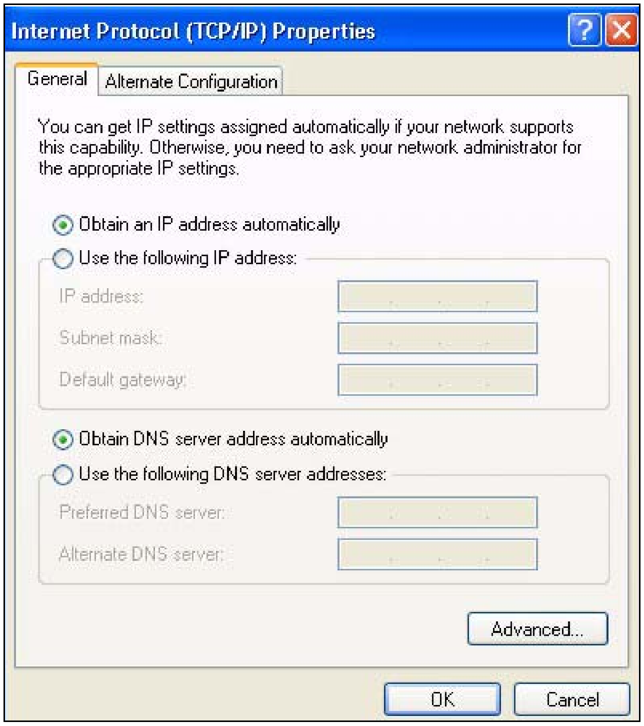
Interface metric:

7 In the **Internet Protocol TCP/IP Properties** window (the **General tab** in Windows XP):

- Click **Obtain DNS server address automatically** if you do not know your DNS server IP address(es).
- If you know your DNS server IP address(es), click **Use the following DNS server addresses**, and type them in the **Preferred DNS server** and **Alternate DNS server** fields.

If you have previously configured DNS servers, click **Advanced** and then the **DNS** tab to order them.

Figure 34 Windows XP: Internet Protocol (TCP/IP) Properties



You can get IP settings assigned automatically if your network supports this capability. Otherwise, you need to ask your network administrator for the appropriate IP settings.

● Obtain an IP address automatically

○ Use the following IP address:

● Obtain DNS server address automatically

○ Use the following DNS server addresses:

8 Click **OK** to close the **Internet Protocol (TCP/IP) Properties** window.

9 Click **Close** (**OK** in Windows 2000/NT) to close the **Local Area Connection Properties** window.

10 Close the **Network Connections** window (**Network and Dial-up Connections** in Windows 2000/NT).

11 Turn on your ZyXEL Device and restart your computer (if prompted).

Verifying Settings

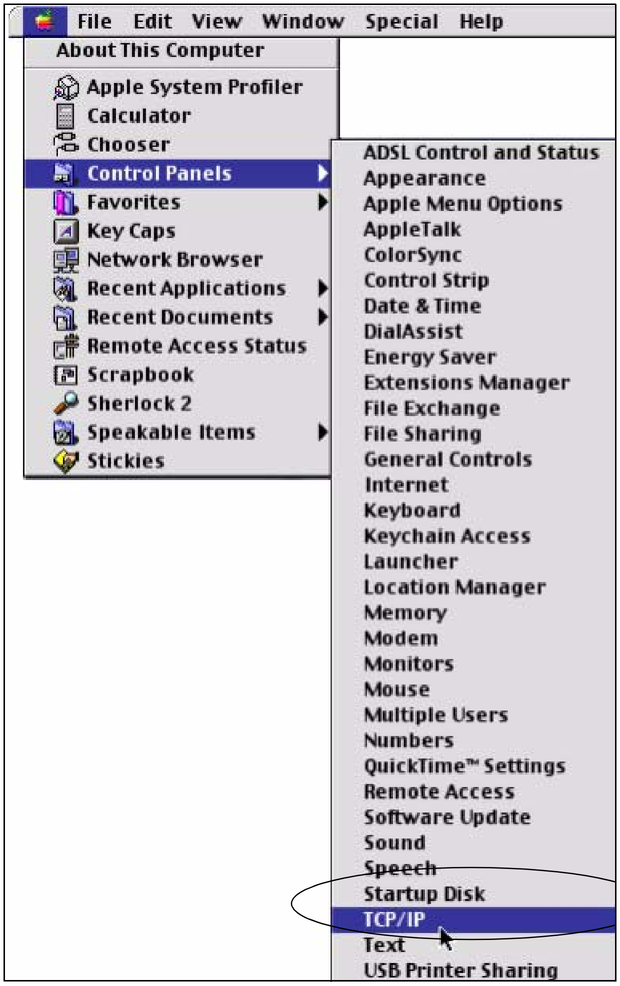
1 Click **Start**, **All Programs**, **Accessories** and then **Command Prompt**.

2 In the **Command Prompt** window, type "ipconfig" and then press [ENTER]. You can also open **Network Connections**, right-click a network connection, click **Status** and then click the **Support** tab.

Macintosh OS 8/9

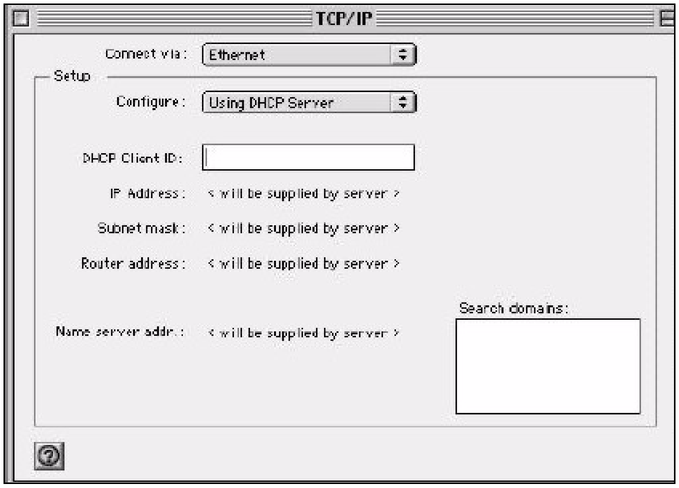
1 Click the **Apple** menu, **Control Panel** and double-click **TCP/IP** to open the **TCP/IP Control Panel**.

Figure 35 Macintosh OS 8/9: Apple Menu



2 Select **Ethernet built-in** from the **Connect via** list.

Figure 36 Macintosh OS 8/9: TCP/IP



TCP/IP

Connect via: Ethernet

Setup

Configure: Using DHCP Server

DHCP Client ID:

IP Address: < will be supplied by server >

Subnet mask: < will be supplied by server >

Router address: < will be supplied by server >

Name server addr.: < will be supplied by server >

Search domains:

3 For dynamically assigned settings, select **Using DHCP Server** from the **Configure:** list.

4 For statically assigned settings, do the following:

- From the **Configure** box, select **Manually**.
- Type your IP address in the **IP Address** box.
- Type your subnet mask in the **Subnet mask** box.
- Type the IP address of your ZyXEL Device in the **Router address** box.

5 Close the **TCP/IP Control Panel**.

6 Click **Save** if prompted, to save changes to your configuration.

7 Turn on your ZyXEL Device and restart your computer (if prompted).

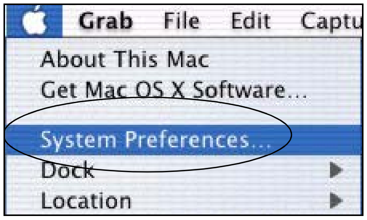
Verifying Settings

Check your TCP/IP properties in the **TCP/IP Control Panel** window.

Macintosh OS X

1 Click the **Apple** menu, and click **System Preferences** to open the **System Preferences** window.

Figure 37 Macintosh OS X: Apple Menu

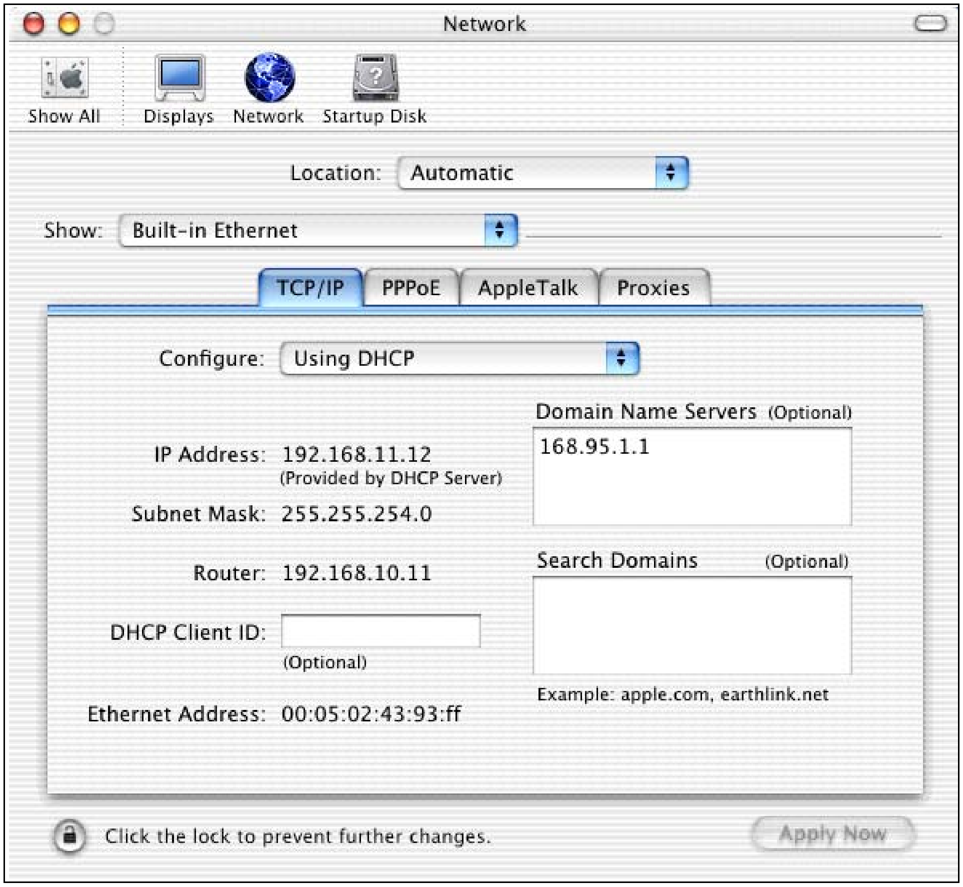


2 Click **Network** in the icon bar.

- Select **Automatic** from the **Location** list.
- Select **Built-in Ethernet** from the **Show** list.
- Click the **TCP/IP** tab.

3 For dynamically assigned settings, select **Using DHCP** from the **Configure** list.

Figure 38 Macintosh OS X: Network



Location: Automatic

Show: Built-in Ethernet

Configure: Using DHCP

Domain Name Servers (Optional)
168.95.1.1

IP Address: 192.168.11.12
(Provided by DHCP Server)

Subnet Mask: 255.255.254.0

Router: 192.168.10.11

Search Domains (Optional)

DHCP Client ID:
(Optional)

Example: apple.com, earthlink.net

Ethernet Address: 00:05:02:43:93:ff

Click the lock to prevent further changes.

4 For statically assigned settings, do the following:

- From the **Configure** box, select **Manually**.
- Type your IP address in the **IP Address** box.
- Type your subnet mask in the **Subnet mask** box.
- Type the IP address of your ZyXEL Device in the **Router address** box.

5 Click **Apply Now** and close the window.

6 Turn on your ZyXEL Device and restart your computer (if prompted).

Verifying Settings

Check your TCP/IP properties in the **Network** window.

Linux

This section shows you how to configure your computer’s TCP/IP settings in Red Hat Linux 9.0. Procedure, screens and file location may vary depending on your Linux distribution and release version.

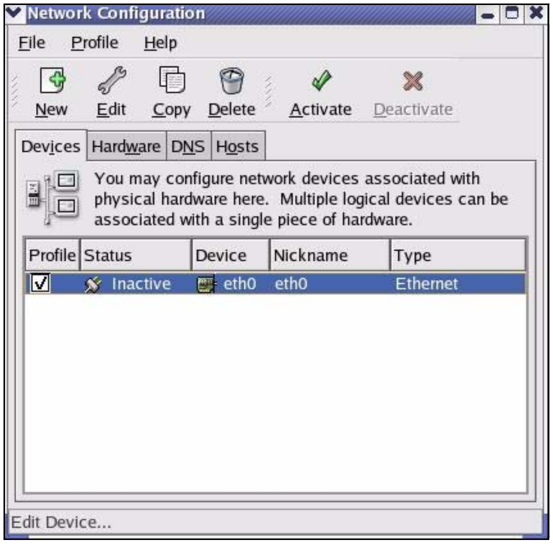
Note: Make sure you are logged in as the root administrator.

Using the K Desktop Environment (KDE)

Follow the steps below to configure your computer IP address using the KDE.

1 Click the Red Hat button (located on the bottom left corner), select **System Setting** and click **Network**.

Figure 39 Red Hat 9.0: KDE: Network Configuration: Devices



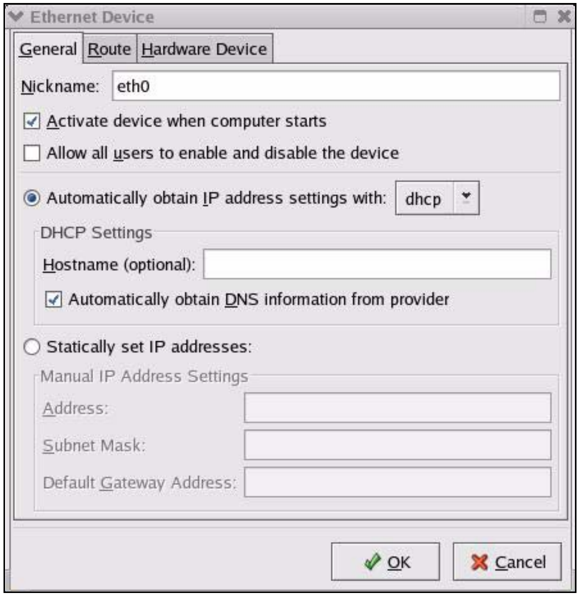
You may configure network devices associated with physical hardware here. Multiple logical devices can be associated with a single piece of hardware.

Profile	Status	Device	Nickname	Type
☑	Inactive	eth0	eth0	Ethernet

Edit Device...

2 Double-click on the profile of the network card you wish to configure. The **Ethernet Device General** screen displays as shown.

Figure 40 Red Hat 9.0: KDE: Ethernet Device: General



Nickname: eth0

☑ Activate device when computer starts

□ Allow all users to enable and disable the device

● Automatically obtain IP address settings with: dhcp

DHCP Settings

Hostname (optional):

☑ Automatically obtain DNS information from provider

○ Statically set IP addresses:

Manual IP Address Settings

Address:

Subnet Mask:

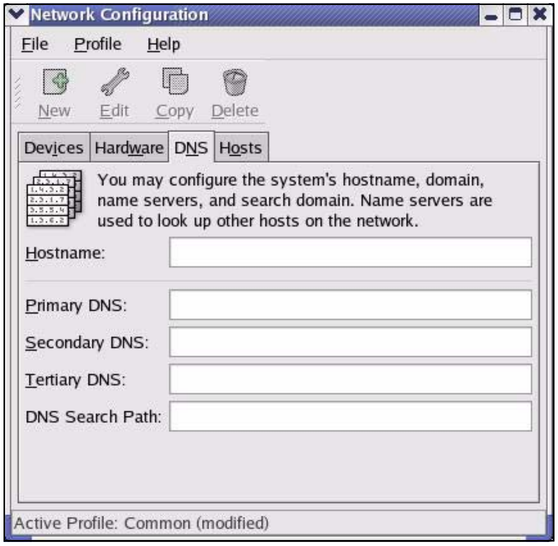
Default Gateway Address:

- If you have a dynamic IP address click **Automatically obtain IP address settings with** and select **dhcp** from the drop down list.
- If you have a static IP address click **Statically set IP Addresses** and fill in the **Address**, **Subnet mask**, and **Default Gateway Address** fields.

3 Click **OK** to save the changes and close the **Ethernet Device General** screen.

4 If you know your DNS server IP address(es), click the **DNS** tab in the **Network Configuration** screen. Enter the DNS server information in the fields provided.

Figure 41 Red Hat 9.0: KDE: Network Configuration: DNS



You may configure the system's hostname, domain, name servers, and search domain. Name servers are used to look up other hosts on the network.

Hostname:

Primary DNS:

Secondary DNS:

Tertiary DNS:

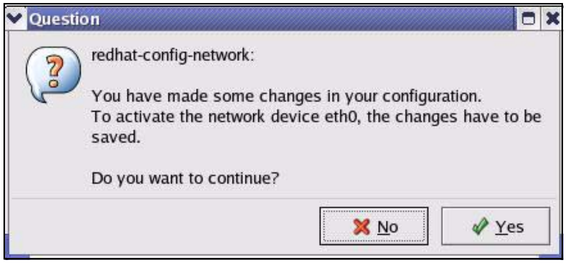
DNS Search Path:

Active Profile: Common (modified)

5 Click the **Devices** tab.

6 Click the **Activate** button to apply the changes. The following screen displays. Click **Yes to save the changes in all screens.**

Figure 42 Red Hat 9.0: KDE: Network Configuration: Activate



redhat-config-network:

You have made some changes in your configuration.
To activate the network device eth0, the changes have to be saved.

Do you want to continue?

7 After the network card restart process is complete, make sure the **Status** is **Active** in the **Network Configuration** screen.

Using Configuration Files

Follow the steps below to edit the network configuration files and set your computer IP address.

1 Assuming that you have only one network card on the computer, locate the `ifconfig-eth0` configuration file (where `eth0` is the name of the Ethernet card). Open the configuration file with any plain text editor.

- If you have a dynamic IP address, enter **dhcp** in the `BOOTPROTO=` field. The following figure shows an example.

Figure 43 Red Hat 9.0: Dynamic IP Address Setting in ifconfig-eth0

```
DEVICE=eth0
ONBOOT=yes
BOOTPROTO=dhcp
USERCTL=no
PEERDNS=yes
TYPE=Ethernet
```

- If you have a static IP address, enter **static** in the BOOTPROTO= field. Type IPADDR= followed by the IP address (in dotted decimal notation) and type NETMASK= followed by the subnet mask. The following example shows an example where the static IP address is 192.168.1.10 and the subnet mask is 255.255.255.0.

Figure 44 Red Hat 9.0: Static IP Address Setting in ifconfig-eth0

```
DEVICE=eth0
ONBOOT=yes
BOOTPROTO=static
IPADDR=192.168.1.10
NETMASK=255.255.255.0
USERCTL=no
PEERDNS=yes
TYPE=Ethernet
```

2 If you know your DNS server IP address(es), enter the DNS server information in the resolv.conf file in the /etc directory. The following figure shows an example where two DNS server IP addresses are specified.

Figure 45 Red Hat 9.0: DNS Settings in resolv.conf

```
nameserver 172.23.5.1
nameserver 172.23.5.2
```

3 After you edit and save the configuration files, you must restart the network card. Enter ./network restart in the /etc/rc.d/init.d directory. The following figure shows an example.

Figure 46 Red Hat 9.0: Restart Ethernet Card

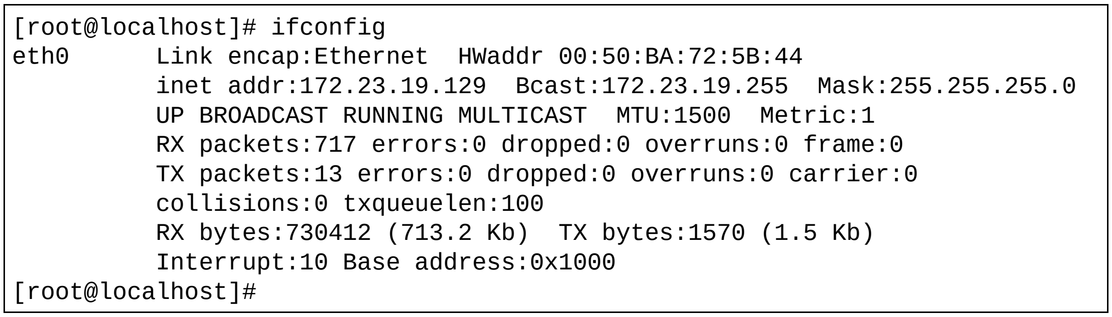
```
[root@localhost init.d]# network restart

Shutting down interface eth0:                 [OK]
Shutting down loopback interface:             [OK]
Setting network parameters:                   [OK]
Bringing up loopback interface:               [OK]
Bringing up interface eth0:                   [OK]
```

Verifying Settings

Enter `ifconfig` in a terminal screen to check your TCP/IP properties.

Figure 47 Red Hat 9.0: Checking TCP/IP Properties



```
[root@localhost]# ifconfig
eth0      Link encap:Ethernet  HWaddr 00:50:BA:72:5B:44
          inet addr:172.23.19.129  Bcast:172.23.19.255  Mask:255.255.255.0
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
          RX packets:717 errors:0 dropped:0 overruns:0 frame:0
          TX packets:13 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:100
          RX bytes:730412 (713.2 Kb)  TX bytes:1570 (1.5 Kb)
          Interrupt:10 Base address:0x1000
[root@localhost]#
```

D

Common Services

The commonly used services and port numbers are shown in the following table. Please refer to RFC 1700 for further information about port numbers. Next to the name of the service, two fields appear in brackets. The first field indicates the IP protocol type (TCP, UDP, or ICMP). The second field indicates the IP port number that defines the service. (Note that there may be more than one IP protocol type. For example, look at the DNS service. (UDP/TCP:53) means UDP port 53 and TCP port 53.

Table 30 Commonly Used Services

SERVICE	DESCRIPTION
AIM/New-ICQ(TCP:5190)	AOL's Internet Messenger service, used as a listening port by ICQ.
AUTH(TCP:113)	Authentication protocol used by some servers.
BGP(TCP:179)	Border Gateway Protocol.
BOOTP_CLIENT(UDP:68)	DHCP Client.
BOOTP_SERVER(UDP:67)	DHCP Server.
CU-SEEME(TCP/UDP:7648, 24032)	A popular videoconferencing solution from White Pines Software.
DNS(UDP/TCP:53)	Domain Name Server, a service that matches web names (e.g. www.zyxel.com) to IP numbers.
FINGER(TCP:79)	Finger is a UNIX or Internet related command that can be used to find out if a user is logged on.
FTP(TCP:20.21)	File Transfer Program, a program to enable fast transfer of files, including large files that may not be possible by e-mail.
H.323(TCP:1720)	NetMeeting uses this protocol.
HTTP(TCP:80)	Hyper Text Transfer Protocol - a client/server protocol for the world wide web.
HTTPS(TCP:443)	HTTPS is a secured http session often used in e-commerce.
ICQ(UDP:4000)	This is a popular Internet chat program.
IKE(UDP:500)	The Internet Key Exchange algorithm is used for key distribution and management.
IPSEC_TUNNEL(AH:0)	The IPSEC AH (Authentication Header) tunneling protocol uses this service.
IPSEC_TUNNEL(ESP:0)	The IPSEC ESP (Encapsulation Security Protocol) tunneling protocol uses this service.
IRC(TCP/UDP:6667)	This is another popular Internet chat program.

Table 30 Commonly Used Services

SERVICE	DESCRIPTION
MSN Messenger(TCP:1863)	Microsoft Networks' messenger service uses this protocol.
MULTICAST(IGMP:0)	Internet Group Multicast Protocol is used when sending packets to a specific group of hosts.
NEW-ICQ(TCP:5190)	An Internet chat program.
NEWS(TCP:144)	A protocol for news groups.
NFS(UDP:2049)	Network File System - NFS is a client/server distributed file service that provides transparent file sharing for network environments.
NNTP(TCP:119)	Network News Transport Protocol is the delivery mechanism for the USENET newsgroup service.
PING(ICMP:0)	Packet INternet Groper is a protocol that sends out ICMP echo requests to test whether or not a remote host is reachable.
POP3(TCP:110)	Post Office Protocol version 3 lets a client computer get e-mail from a POP3 server through a temporary connection (TCP/IP or other).
PPTP(TCP:1723)	Point-to-Point Tunneling Protocol enables secure transfer of data over public networks. This is the control channel.
PPTP_TUNNEL(GRE:0)	Point-to-Point Tunneling Protocol enables secure transfer of data over public networks. This is the data channel.
RCMD(TCP:512)	Remote Command Service.
REAL_AUDIO(TCP:7070)	A streaming audio service that enables real time sound over the web.
REXEC(TCP:514)	Remote Execution Daemon.
RLOGIN(TCP:513)	Remote Login.
RTELNET(TCP:107)	Remote Telnet.
RTSP(TCP/UDP:554)	The Real Time Streaming (media control) Protocol (RTSP) is a remote control for multimedia on the Internet.
SFTP(TCP:115)	Simple File Transfer Protocol.
SMTP(TCP:25)	Simple Mail Transfer Protocol is the message-exchange standard for the Internet. SMTP enables you to move messages from one e-mail server to another.
SNMP(TCP/UDP:161)	Simple Network Management Program.
SNMP-TRAPS(TCP/UDP:162)	Traps for use with the SNMP (RFC:1215).
SQL-NET(TCP:1521)	Structured Query Language is an interface to access data on many different types of database systems, including mainframes, midrange systems, UNIX systems and network servers.
SSH(TCP/UDP:22)	Secure Shell Remote Login Program.
STRM WORKS(UDP:1558)	Stream Works Protocol.
SYSLOG(UDP:514)	Syslog allows you to send system logs to a UNIX server.
TACACS(UDP:49)	Login Host Protocol used for (Terminal Access Controller Access Control System).

Table 30 Commonly Used Services

SERVICE	DESCRIPTION
TELNET(TCP:23)	Telnet is the login and terminal emulation protocol common on the Internet and in UNIX environments. It operates over TCP/IP networks. Its primary function is to allow users to log into remote host systems.
TFTP(UDP:69)	Trivial File Transfer Protocol is an Internet file transfer protocol similar to FTP, but uses the UDP (User Datagram Protocol) rather than TCP (Transmission Control Protocol).
VDOLIVE(TCP:7000)	Another videoconferencing solution.

E

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The device complies with Part 15 of FCC rules. Operation is subject to the following two conditions:

- This device may not cause harmful interference.

- This device must accept any interference received, including interference that may cause undesired operations.

This device has been tested and found to comply with the limits for a Class B digital device pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This device generates, uses, and can radiate radio frequency energy, and if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation.

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2. Increase the separation between the equipment and the receiver.
3. Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
4. Consult the dealer or an experienced radio/TV technician for help.

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- This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.
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注意 ！

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Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

This device has been designed for the WLAN 2.4 GHz network throughout the EC region and Switzerland, with restrictions in France.

This Class B digital apparatus complies with Canadian ICES-003.

Cet appareil numérique de la classe B est conforme à la norme NMB-003 du Canada.

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1 Go to http://www.zyxel.com.

2 Select your product on the ZyXEL home page to go to that product's page.

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F

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- Warranty Information.
- Date that you received your device.
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Corporate Headquarters (Worldwide)

- Support E-mail: support@zyxel.com.tw
- Sales E-mail: sales@zyxel.com.tw
- Telephone: +886-3-578-3942
- Fax: +886-3-578-2439
- Web: www.zyxel.com
- Regular Mail: ZyXEL Communications Corp., 6 Innovation Road II, Science Park, Hsinchu 300, Taiwan

China - ZyXEL Communications (Beijing) Corp.

- Support E-mail: cso.zycn@zyxel.cn
- Sales E-mail: sales@zyxel.cn
- Telephone: +86-010-82800646
- Fax: +86-010-82800587
- Address: 902, Unit B, Horizon Building, No.6, Zhichun Str, Haidian District, Beijing
- Web: http://www.zyxel.cn

China - ZyXEL Communications (Shanghai) Corp.

- Support E-mail: cso.zycn@zyxel.cn
- Sales E-mail: sales@zyxel.cn
- Telephone: +86-021-61199055
- Fax: +86-021-52069033

- Address: 1005F, ShengGao International Tower, No.137 XianXia Rd., Shanghai
- Web: http://www.zyxel.cn

Costa Rica

- Support E-mail: soporte@zyxel.co.cr
- Sales E-mail: sales@zyxel.co.cr
- Telephone: +506-2017878
- Fax: +506-2015098
- Web: www.zyxel.co.cr
- Regular Mail: ZyXEL Costa Rica, Plaza Roble Escazú, Etapa El Patio, Tercer Piso, San José, Costa Rica

Czech Republic

- E-mail: info@cz.zyxel.com
- Telephone: +420-241-091-350
- Fax: +420-241-091-359
- Web: www.zyxel.cz
- Regular Mail: ZyXEL Communications, Czech s.r.o., Modranská 621, 143 01 Praha 4 - Modrany, Ceská Republika

Denmark

- Support E-mail: support@zyxel.dk
- Sales E-mail: sales@zyxel.dk
- Telephone: +45-39-55-07-00
- Fax: +45-39-55-07-07
- Web: www.zyxel.dk
- Regular Mail: ZyXEL Communications A/S, Columbusvej, 2860 Soeborg, Denmark

Finland

- Support E-mail: support@zyxel.fi
- Sales E-mail: sales@zyxel.fi
- Telephone: +358-9-4780-8411
- Fax: +358-9-4780-8448
- Web: www.zyxel.fi
- Regular Mail: ZyXEL Communications Oy, Malminkaari 10, 00700 Helsinki, Finland

France

- E-mail: info@zyxel.fr
- Telephone: +33-4-72-52-97-97
- Fax: +33-4-72-52-19-20
- Web: www.zyxel.fr
- Regular Mail: ZyXEL France, 1 rue des Vergers, Bat. 1 / C, 69760 Limonest, France

Germany

- Support E-mail: support@zyxel.de
- Sales E-mail: sales@zyxel.de
- Telephone: +49-2405-6909-69
- Fax: +49-2405-6909-99
- Web: www.zyxel.de
- Regular Mail: ZyXEL Deutschland GmbH., Adenauerstr. 20/A2 D-52146, Wuerselen, Germany

Hungary

- Support E-mail: support@zyxel.hu
- Sales E-mail: info@zyxel.hu
- Telephone: +36-1-3361649
- Fax: +36-1-3259100
- Web: www.zyxel.hu
- Regular Mail: ZyXEL Hungary, 48, Zoldlomb Str., H-1025, Budapest, Hungary

India

- Support E-mail: support@zyxel.in
- Sales E-mail: sales@zyxel.in
- Telephone: +91-11-30888144 to +91-11-30888153
- Fax: +91-11-30888149, +91-11-26810715
- Web: http://www.zyxel.in
- Regular Mail: India - ZyXEL Technology India Pvt Ltd., II-Floor, F2/9 Okhla Phase -1, New Delhi 110020, India

Japan

- Support E-mail: support@zyxel.co.jp
- Sales E-mail: zyp@zyxel.co.jp
- Telephone: +81-3-6847-3700
- Fax: +81-3-6847-3705
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- Regular Mail: ZyXEL Japan, 3F, Office T&U, 1-10-10 Higashi-Gotanda, Shinagawa-ku, Tokyo 141-0022, Japan

Kazakhstan

- Support: http://zyxel.kz/support
- Sales E-mail: sales@zyxel.kz
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Malaysia

- Support E-mail: support@zyxel.com.my
- Sales E-mail: sales@zyxel.com.my
- Telephone: +603-8076-9933
- Fax: +603-8076-9833
- Web: http://www.zyxel.com.my
- Regular Mail: ZyXEL Malaysia Sdn Bhd., 1-02 & 1-03, Jalan Kenari 17F, Bandar Puchong Jaya, 47100 Puchong, Selangor Darul Ehsan, Malaysia

North America

- Support E-mail: support@zyxel.com
- Support Telephone: +1-800-978-7222
- Sales E-mail: sales@zyxel.com
- Sales Telephone: +1-714-632-0882
- Fax: +1-714-632-0858
- Web: www.zyxel.com
- Regular Mail: ZyXEL Communications Inc., 1130 N. Miller St., Anaheim, CA 92806-2001, U.S.A.

Norway

- Support E-mail: support@zyxel.no
- Sales E-mail: sales@zyxel.no
- Telephone: +47-22-80-61-80
- Fax: +47-22-80-61-81
- Web: www.zyxel.no
- Regular Mail: ZyXEL Communications A/S, Nils Hansens vei 13, 0667 Oslo, Norway

Poland

- E-mail: info@pl.zyxel.com
- Telephone: +48-22-333 8250
- Fax: +48-22-333 8251
- Web: www.pl.zyxel.com
- Regular Mail: ZyXEL Communications, ul. Okrzei 1A, 03-715 Warszawa, Poland

Russia

- Support: http://zyxel.ru/support
- Sales E-mail: sales@zyxel.ru
- Telephone: +7-095-542-89-29
- Fax: +7-095-542-89-25
- Web: www.zyxel.ru
- Regular Mail: ZyXEL Russia, Ostrovityanova 37a Str., Moscow 117279, Russia

Singapore

- Support E-mail: support@zyxel.com.sg
- Sales E-mail: sales@zyxel.com.sg
- Telephone: +65-6899-6678
- Fax: +65-6899-8887
- Web: http://www.zyxel.com.sg
- Regular Mail: ZyXEL Singapore Pte Ltd., No. 2 International Business Park, The Strategy #03-28, Singapore 609930

Spain

- Support E-mail: support@zyxel.es
- Sales E-mail: sales@zyxel.es
- Telephone: +34-902-195-420
- Fax: +34-913-005-345
- Web: www.zyxel.es
- Regular Mail: ZyXEL Communications, Arte, 21 5ª planta, 28033 Madrid, Spain

Sweden

- Support E-mail: support@zyxel.se
- Sales E-mail: sales@zyxel.se
- Telephone: +46-31-744-7700
- Fax: +46-31-744-7701
- Web: www.zyxel.se
- Regular Mail: ZyXEL Communications A/S, Sjöporten 4, 41764 Göteborg, Sweden

Taiwan

- Support E-mail: support@zyxel.com.tw
- Sales E-mail: sales@zyxel.com.tw
- Telephone: +886-2-27399889
- Fax: +886-2-27353220
- Web: http://www.zyxel.com.tw
- Address: Room B, 21F., No.333, Sec. 2, Dunhua S. Rd., Da-an District, Taipei

Thailand

- Support E-mail: support@zyxel.co.th
- Sales E-mail: sales@zyxel.co.th
- Telephone: +662-831-5315
- Fax: +662-831-5395
- Web: http://www.zyxel.co.th
- Regular Mail: ZyXEL Thailand Co., Ltd., 1/1 Moo 2, Ratchaphruk Road, Bangrak-Noi, Muang, Nonthaburi 11000, Thailand.

Turkey

- Support E-mail: cso@zyxel.com.tr
- Telephone: +90 212 222 55 22
- Fax: +90-212-220-2526
- Web: http:www.zyxel.com.tr
- Address: Kaptanpasa Mahallesi Piyalepasa Bulvari Ortadogu Plaza N:14/13 K:6 Okmeydani/Sisli Istanbul/Turkey

Ukraine

- Support E-mail: support@ua.zyxel.com
- Sales E-mail: sales@ua.zyxel.com
- Telephone: +380-44-247-69-78
- Fax: +380-44-494-49-32
- Web: www.ua.zyxel.com
- Regular Mail: ZyXEL Ukraine, 13, Pimonenko Str., Kiev 04050, Ukraine

United Kingdom

- Support E-mail: support@zyxel.co.uk
- Sales E-mail: sales@zyxel.co.uk
- Telephone: +44-1344-303044, 0845 122 0301 (UK only)
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- Web: www.zyxel.co.uk
- Regular Mail: ZyXEL Communications UK Ltd., 11 The Courtyard, Eastern Road, Bracknell, Berkshire RG12 2XB, United Kingdom (UK)

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